Using DOS

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The User-Friendly Reference

Find the quickest way to DOS success!

No-nonsense tips and shortcuts in plain English

Gerry Routledge

Here's what people are saying about Que's *Using DOS*...

"Any functional understanding of PCs begins with DOS, yet it remains a mysterious and forbidding entity for most users. The popularity of Windows by no means removes the need for understanding DOS—after all, Windows still uses the DOS file system. Fortunately, Gerry Routledge has now written a book that clarifies DOS essentials in fine style. Gerry's enthusiasm, humor, and aversion to irrelevant detail combine to make *Using DOS* very approachable as well as eminently practical. If you've ever wished you knew your DIR from your VER, make this your book."

Glenn Weadock, President
Independent Software, Inc.

"As a complete source of clear answers to basic questions, *Using DOS* is hard to beat. The style is friendly without being cute. The author never forgets that the reason you wanted a reference was to help you get your work done. It's very easy to find what you need in *Using DOS*.

Using DOS stands out from other basic books. Troubleshooting tips appear throughout the book and in a special chapter. These answer about 99 percent of all the questions most people ever have about their computers. And there is a very complete, well-organized reference section.

If you need fast solutions to real-world problems with your PC and DOS, *Using DOS* is the best source you could find. It's also a book you'll keep around as long as you have DOS on your computer. If you run a Help Desk, you will want to buy a copy of *Using DOS* for each department in your company. *Using DOS* gives new PC users the kind of support they need."

Bill Brandon
President, Accomplishment Technology Unlimited
System Operator, CompuServe's Help Forum

"This book avoids PC jargon to explain how to get done what you want to get done in DOS. The analogies to operating household appliances and office equipment were very helpful. The author uses everyday words and phrases to clearly explain how to use DOS. As an experienced DOS user, even I learned some new things!"

Ken Jacobs, President
Tek-Write, Inc.

Using DOS

Gerald R. Routledge
with
Suzanne Weixel
Michael O'Mara

que

Using DOS

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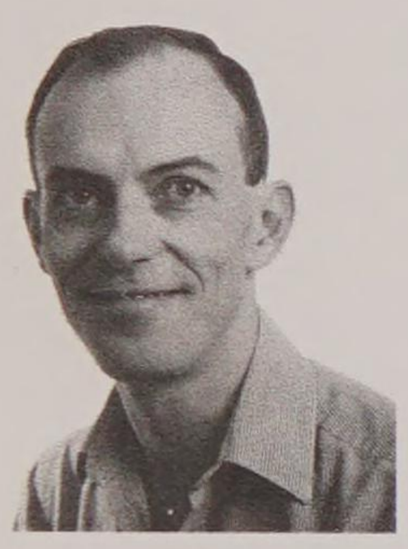
Dedication

For my son, Adam, with love and to his football team, the Sunnybrooke Chiefs. While they never won a lot of games, they provided me with ample time to think about what I wanted to write in this book.

Gerry Routledge

About the Authors



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My family, who tried to understand why Daddy couldn't come out of his office for two months. And my mom who said, "Finish the darn thing. We'll see the grandchildren another time."

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In addition to exploring our forum, please feel free to contact me personally to discuss your opinions of this book: on CompuServe, I'm at 72002,2515, and on the Internet, I'm **rdrake@que.mcp.com**.

Thanks in advance—your comments will help us to continue publishing the best books available on computer topics in today's market.

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Contents at a Glance

Introduction

What makes this book different? 2
How do I use this book? 2
How this book is put together 2

Getting Started with DOS

1 First Things You Should Know about DOS 9
2 Time to Jump in with Both Feet 23

How to Work with DOS Files and Directories

3 Get Started with the DOS Filing System 37
4 More Drive and Directory Stuff 49
5 How to Examine the Files on Your Disk 61
6 DOS Stuff You Can Do with Disks 69
7 How to Copy, Rename, and/or Move Your Files 83
8 Deleting All Those Darn Copies 97
9 Organize Your Disk with Directories 109

Preventive Maintenance for Your PC

10 What Happens When You Start Your Computer? 123
11 How to Edit Startup Files with the MS-DOS Editor (and Without It) 139
12 Disaster Prevention: Back Up! Back Up! Back Up! 151
13 Restoring the Backup (and You Will) 171
14 Good Things You Can Do for Your Disks 183
15 Do You Know Enough about Viruses? 199
16 Safe Computing—How to Protect Your PC from Viruses 209

Using Other Programs with DOS

17 A PC's Not Much Good without Application Software 223
18 Basic Guide to Installing New Software 237
19 Running DOS Software 249

What about Windows?

20 Windows! Doesn't Anybody DIR Anymore? 261
21 Using the Windows File Manager 273
22 Sneaking Back to DOS from Windows 283

VI

Making Your Computer Work Faster and Smarter

23 Make the Most of Your Memory with MemMaker 293
24 Cram More Data onto Your Disk with DoubleSpace and DriveSpace 309
25 Cool DOS Tools: DOS Shell, Help, and Batch Files 321
26 Troubleshooting Tips That Anybody Can Try 337

VII

Reference Stuff

27 Mini Command Reference 351
28 Oops...What's This Error Message? 365

Glossary **389**

Index **405**

{Table of Contents}

Introduction

What makes this book different? 2
How do I use this book? 2
How this book is put together 2
- Part I: Getting Started with DOS 3
- Part II: How to Work with DOS Files and Directories 3
- Part III: Preventive Maintenance for Your PC 3
- Part IV: Using Other Programs with DOS 4
- Part V: What about Windows? 4
- Part VI: Making Your Computer Work Faster and Smarter 4
- Part VII: Reference Stuff 4
- Glossary 5
- Need more information? Try these other books 5
- Information that's easy to understand 6

Part I: Getting Started with DOS

Chapter 1: First Things You Should Know about DOS

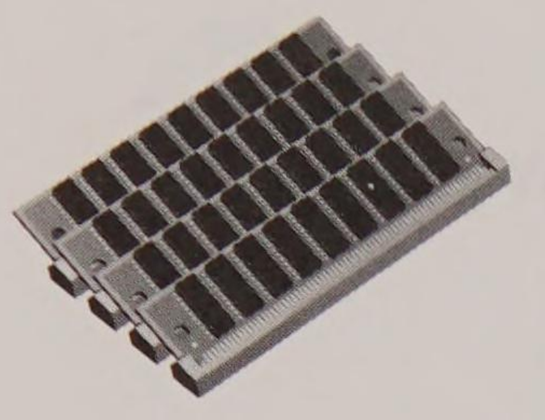
You command and DOS obeys

see page 14

What is DOS anyway? 9
- There's more than one kind of DOS 10

So what good is DOS? What does it do for me? 11
- DOS tracks and controls the hardware 11
- DOS keeps the software in line 12
- DOS stores your information and helps you find it again ... 13
- DOS helps you talk to your computer 13

You command and DOS obeys 14
- You have to play by the rules 15



Important things that are part of your PC 15
The CPU is the brains of your computer 16
What's RAM? 18
Stuff you should know about your disks and drives 19
The keyboard is for two-fisted typists 20

Chapter 2: Time to Jump in with Both Feet

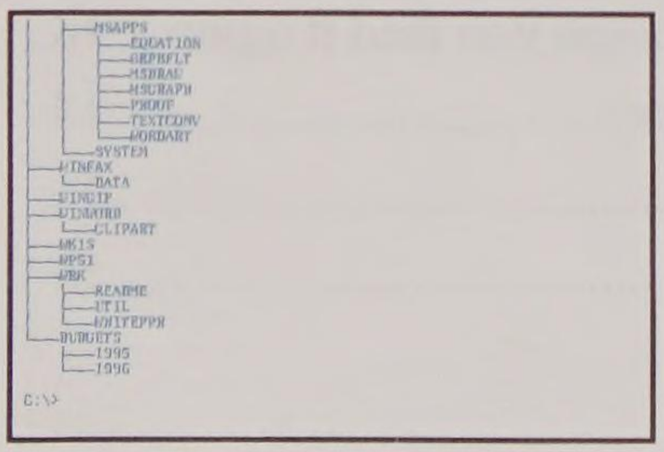
What happens if I don't type it right?

see page 32

Let's start at the very beginning 24
Here's DOS 25
Where's DOS? 26
Something cool is on my screen and it's definitely not DOS 28
Some important details about DOS commands 29
Syntax is a complex term for a simple concept 30
Command and parameter are pretty easy, too 31
Don't forget the switches! 32
What happens if I don't type it right? 32
Now give DOS a try 33
Find out what DOS version you use 33
Clear your screen 34
Um, the computer doesn't seem to be working 35

Part II: How to Work with DOS Files and Directories

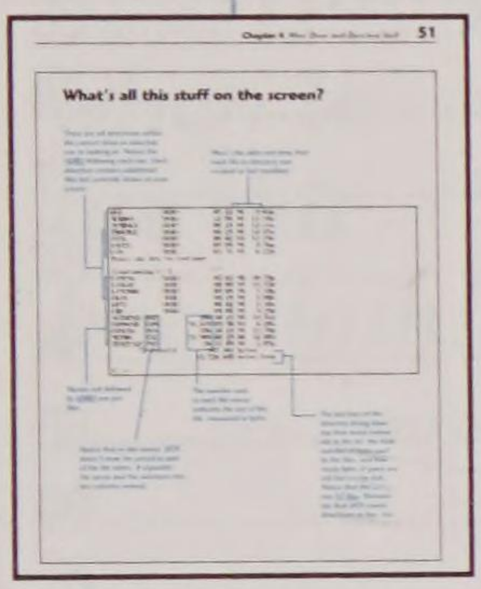
Chapter 3: Get Started with the DOS Filing System



What is a file, really? 38
Can I name my file Fred? 38
Every drive has a name 39
How to use drive names 41
You can divide your disk into directories 42
First the drawers—called *directories* 42
Now what if the drawers had file folders inside? 42
Start from the root and climb the tree 42
Or better yet, follow the path 43
How do you type a path? 44

How to make directories 45
Take a look at your directory tree 46

Chapter 4: More Drive and Directory Stuff

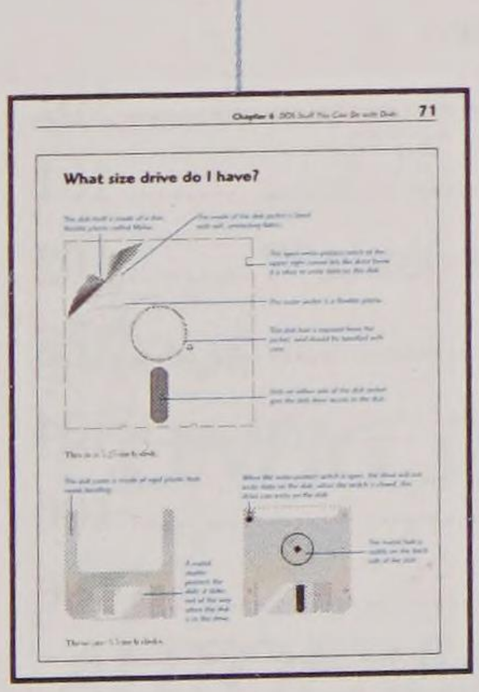

What's all this stuff on the screen?

What's on the disk? Use DIR to find out 49
Now DIR another drive 50
Now DIR another directory 50
What's all this stuff on the screen? 51
Change the default drive 52
Change the default directory 53
View a partial file list with wild cards 55
The question mark replaces just one character at a time ... 56
The asterisk can stand for a bunch of characters 58

Chapter 5: How to Examine the Files on Your Disk

Making files with DOS 61
Looking inside files with DOS 63
If you see happy faces, it's not a text file 64
What are all these files for, anyway? 64
Listing the files in a wide format 65
The EXE and COM files run programs 66
How to print a directory listing 67

Chapter 6: DOS Stuff You Can Do with Disks


What size drive do I have?

Disks come in different sizes 70
What density drive do I have? 70
What size drive do I have? 71
How much can my disk hold? 73
Getting a floppy disk ready to use 74
How do I format a floppy disk? 75
Oops! I didn't mean to format THAT one! 77
What's an emergency boot disk? And how do I make one? 78
Can I copy a floppy disk? 79
Will that be two drives... 80
...or one? 80
And now a word about disk protection 81
Label your disks 81

Write-protect your disks 81
Use common sense 82

Chapter 7: How to Copy, Rename, and/or Move Your Files

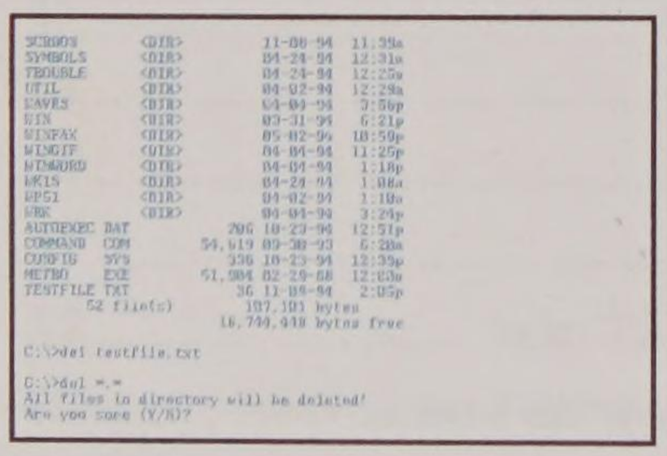
What does COPY really do? 84
What do you mean, it *replaces* the file? 85
How to copy a single file 85
What if the file is in a different directory? 86
I keep getting `Bad command or file name` 86
How to make a copy with a different name 87
How to copy seven (or more) with one blow 88
Now copy and rename at the same time 88
Be specific with COPY: Tell it which directory to use 89
Other methods that save keystrokes 90
Copy to the default directory 91
Copy from the default directory 91
A better method for renaming files 92
I got `Duplicate file name or file not found` 93
How to move files from place to place 93
How to copy a directory and all its subdirectories 94
Copying entire directory trees 95

I keep getting Bad command or file name

see page 86

Chapter 8: Deleting All Those Darn Copies

What happens when I delete a file? 98
How to delete a single file 98
Can I delete a file in another drive or directory? 99
A little more dangerous: delete with wild cards 100
You can even delete all the files at once (are you sure you want to?) 101
Be careful: * may not do what you expect 101
So how do I delete a group of files without using *? 102
Save typing with the F3 key 103
Now would be a good time to undelete 104
Does undeleting always work? 106
How to undelete a group of files 106
How do I increase my chances of a successful undelete? 107
Delete Sentry 107

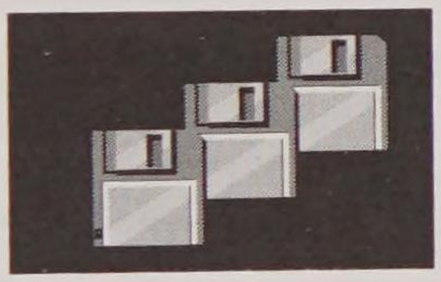


Delete Tracker 107
Defragment your hard disk regularly 108

Chapter 9: Organize Your Disk with Directories

I don't understand when to use this backslash!

see page 117



Why do I need directories? 109
What directories do I have now? 110
Plan your directories 112
Now start making your own directories 112
Create the first level 113
And now the second level 114
Climbing around in the DOS tree 115
How do I go back up the directories one level at a time? 116
How do I get from a directory to its subdirectories? 117
I don't understand when to use this backslash! 117
How to remove unwanted directories 118
Remove just one directory 118
Now get rid of a branch that's farther down the tree 119
Can't I remove an entire branch of directories? 120
How to use DELTREE to erase an entire disk 120
How to rename a directory 121

Part III: Preventive Maintenance for Your PC

Chapter 10: What Happens When You Start Your Computer?

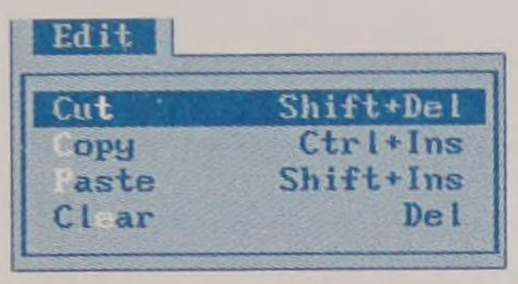
Meet CONFIG.SYS and AUTOEXEC.BAT

see pages 126-130

POST time! Boot up the old PC 124
What's this CONFIG.SYS thing? 126
Keep hearing about device drivers? Now you'll understand them 128
How the command lines in CONFIG.SYS work 128
Now tell me about AUTOEXEC.BAT 130
How to save time and trouble with AUTOEXEC.BAT 131
Stepping through the CONFIG.SYS and AUTOEXEC.BAT 132
Stepping through CONFIG.SYS one line at a time 133
Skipping both startup files 134
Loading stuff high 135
How to load device drivers high 136

How to load TSRs and other programs high 137
MemMaker does the dirty work 138

Chapter 11: How to Edit Startup Files with the MS-DOS Editor (and Without It)



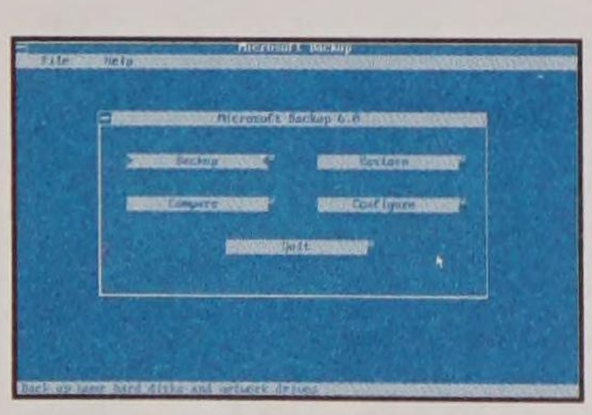
Changes you might want to make in your startup files 140
CONFIG.SYS changes 140
AUTOEXEC.BAT changes 141
Ready to try it? Wait! Back up the originals just in case 142
Now start the Editor and open the file 143
Basic editing 145
For more elaborate stuff, use the Edit menu 146
When you're done making changes (for now), exit 148
What if I don't have Edit? 148

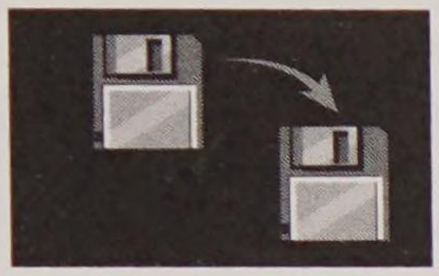
Chapter 12: Disaster Prevention: Back Up! Back Up! Back Up!

What's a backup and how do I get one? 151
Why is a backup so important? 153
When should I back up? 153
What does it mean to *restore* a backup? 154
Things to think about before backing up 154
Is the hard disk healthy? 154
How many floppy disks do you need? 156
Things you should do after backing up 158
How you back up depends on your version of DOS 159
Backing up with DOS version 5 and earlier 160
Backing up the entire hard disk 160
From the DOS Shell 160
From the DOS Prompt 161
Do I have to back up everything? 162
I just want to back up a directory or two 162
Backing up with DOS version 6 and later 163
How to use Microsoft Backup 164
Backing up the entire hard disk 165

When should I back up?

see page 153





Neat things you can do with Microsoft Backup 166
Run a compatibility test 166
Pick and choose the files you want to back up 167
Make a different type of backup 168
Compare backup files to the original files 168
Glub—I'm drowning in diskettes 168

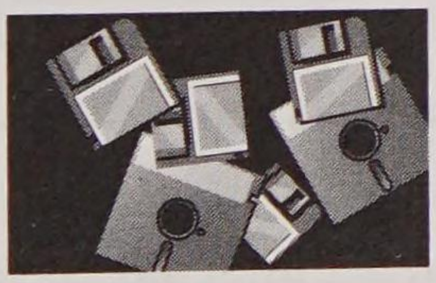
Chapter 13: Restoring the Backup (and You Will)

Some basics about the Restore feature 171
When do I restore? 172
Is it just a headache… 173
…or a disaster? 173
No, it's a catastrophe!! 174
In case of emergency, follow these steps 174
What to do before you restore 175
How to restore lost files with the RESTORE command 176
Restoring all files 176
From the DOS Shell 176
From the DOS Prompt 177
I just want to restore a few files 178
How to restore lost files with Microsoft Backup 179
Remind me—what's a catalog file for? 180
Restoring the entire hard disk 181
Restoring just a few files or directories 182

In case of emergency, follow these steps

see page 174

Chapter 14: Good Things You Can Do for Your Disks



So what typically goes wrong with a disk? 184
Give your disks a quick checkup 185
Checking your hard disk with CHKDSK 186
Checking your hard disk with ScanDisk 188
Somebody said my disk is fragmented.
What does that mean? 191
How to defragment a hard disk 192
How to defragment a DoubleSpace drive 194
Speed up your system with a disk cache 194
What's good about a disk cache? 195
Okay, so what's the down side? 195

How to defragment a hard disk

see page 192

How to use SmartDrive 195
Using SmartDrive 6.2 197
You can even use SmartDrive with Windows 197

Chapter 15: Do You Know Enough about Viruses?

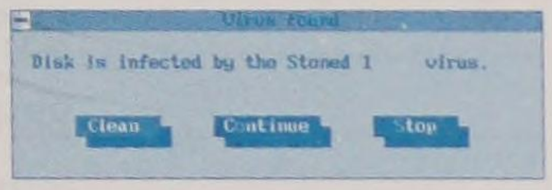
So what's a virus? 199
What does the virus do? 200
How do you become infected? 201
What about downloading files? Isn't that safe either? 202
Some schools share more than knowledge 202
File infectors 203
Boot sector viruses 203
When you get a virus, what happens? 204
Self-replicating viruses 204
Trojan horse viruses 205
This Trojan horse fooled almost everybody! 205
Logic bomb viruses 205
The most common viruses 206
What are my chances of catching something? 206

Chapter 16: Safe Computing—How to Protect Your PC from Viruses

Anti-virus strategies 210
Trust no one 210
Deal with reputable bulletin boards 211
Don't be a software pirate 211
Keep your anti-virus software up to date 212
Use memory-resident anti-virus programs 212
Emergency disks and backups 213
If it's not write-protected, it can get infected 213
When to throw in the towel 214
Aren't you glad you use backups? 214
The "big five" virus scanners 215
Microsoft Anti-Virus 215
Central Point Anti-Virus 216
Norton Anti-Virus 216

Anti-virus strategies

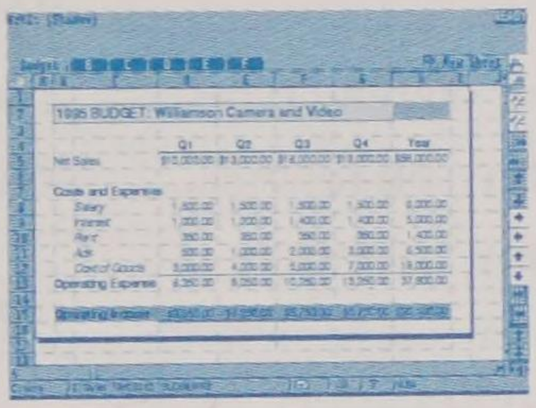
see page 210



John McAfee's Viruscan 216
F-Prot Professional 217
How to scan a disk with Microsoft Anti-Virus 218
Changing MSAV's options 220
Running MSAV every time your PC starts 221
Using memory-resident programs 221
What does VSAFE do? 222
Changing VSAFE's options 222
Nobody's perfect 222

Part IV: Using Other Programs with DOS

Chapter 17: A PC's Not Much Good without Application Software



What about shareware?

see page 234

There's plenty of software to choose from! 224
Word processing 224
Spreadsheets 225
Databases 225
Accounting and finance 226
Graphics and presentations 227
Computer Aided Design (CAD) 228
Desktop publishing 228
Communications 228
Organizers 228
Utilities 230
Games 230
How to pick the program that's right for you 231
Know your PC's limitations 231
Know your own limitations 231
Ask at least two friends 232
Try before you buy 232
Uh-oh. This program requires Microsoft Windows 232
A software suite or integrated package might do the trick 233
About software upgrades 233
What about shareware? 234

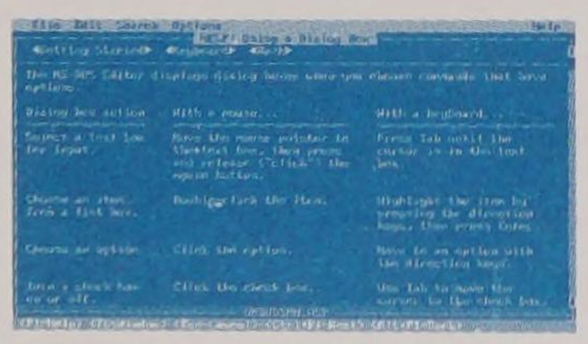
Chapter 18: Basic Guide to Installing New Software

Wait! Check the system requirements before you buy anything! 237
What do I need? 238
How much memory do I have? 239
How much disk space do I have? 239
What kind of hardware do I have? 240
I think I have more than they're asking for 241
Steps for a successful installation 241
Make copies of the floppy disks 241
Decide on a final resting place for the files 242
What if there's no installation program? 243
How to install a DOS program 243
What to expect while installing 244
Insufficient disk space 244
You usually have to indicate your display type 244
Do you know what kind of printer you have? 245
Sometimes it doesn't even ask any hardware questions 245
What if the program wants to modify your CONFIG.SYS and AUTOEXEC.BAT files? 246
Basic steps for installing a Windows program 247

What if there's no installation program?

see page 243

Chapter 19: Running DOS Software



I know I installed the program. Where did it go? 250
Look for a new directory 250
Search for executable files 251
Give up and read the manual 252
Let's hope it has a menu 252
And mouse support would be nice 253
There's a menu, but no mouse! 254
A dialog box means you're still in charge 254
They're easiest with a mouse, but if you insist... 255
Saving is usually easy... 256
...but printing is fairly complicated 257
Getting help 258

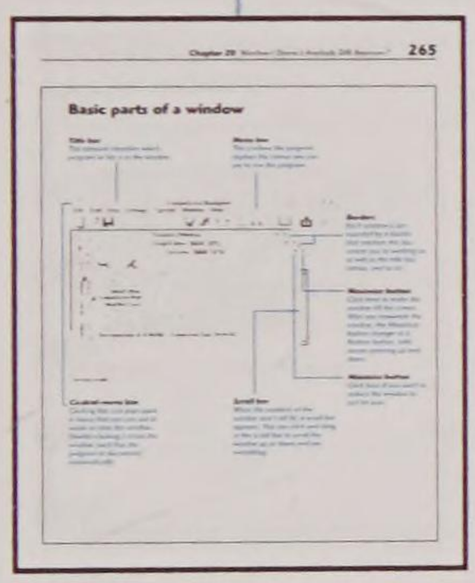
Getting help

see page 258

How do I get outta here? 259
The wrong way to exit 259
Finding the exit 260

Part V: What about Windows?

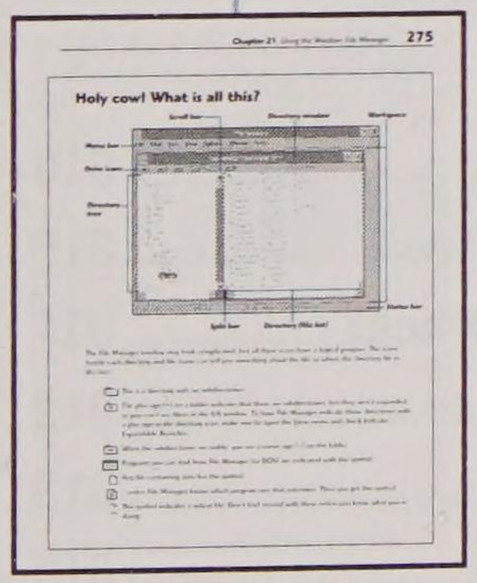
Chapter 20: Windows! Doesn't Anybody DIR Anymore?


Chapter 20 Windows! Doesn't Anybody DIR Anymore? 265

Basic parts of a window

So what is Windows, exactly? 262
Why it's called Windows 262
How to start Windows 264
All Windows programs look and act sort of similar 264
How to use menus 264
Basic parts of a window 265
Stupid mouse tricks you should learn 266
Move or resize windows as you like 267
Minimize the window to an icon 267
Maximize it to full-screen size 268
Restore a maximized window 269
Hello, I'm your Program Manager 269
How to start any program in Windows 270
Quitting Windows 271

Chapter 21: Using the Windows File Manager


Chapter 21 Using the Windows File Manager 275

Holy cow! What is all this?

How to Start File Manager 273
File Manager basics 274
Holy cow! What is all this? 275
The disk drive icons 276
What does your directory tree look like? 277
And what's inside each directory? 277
You can open more windows, too 277
Easy copying and moving 279
How to work with groups of files 280
Practice safe deleting 281
And this is better than the REN command 282

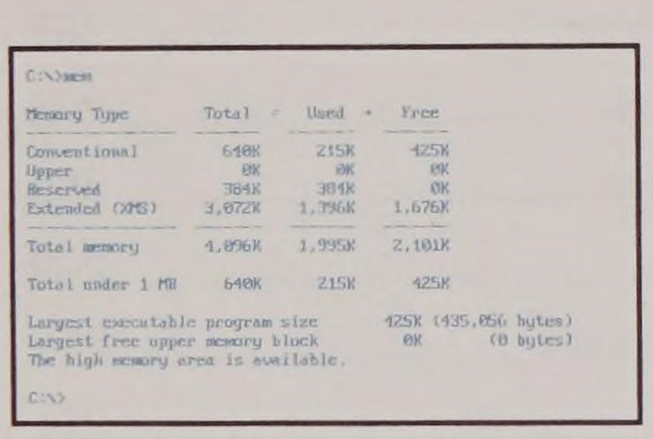
Chapter 22: Sneaking Back to DOS from Windows

How to get to the DOS prompt from Windows 284
How do I start DOS from File Manager? 286
I'd rather work from the DOS Shell, though 287
How do I get back to Windows? 287
Never try this from Windows! 288

Part VI: Making Your Computer Work Faster and Smarter

Chapter 23: Make the Most of Your Memory with MemMaker

How does DOS use memory? 293
If memory isn't conventional, what is it? 294
How much memory do I have on my computer? 295
How much memory do I need? 296



You don't need an MBA to manage your memory 296
So what does MemMaker do? 298
Just in case—back up your startup files first 299
Okay, let 'er rip 300
Which setup should I use? 302
Do I need expanded WHAT? 303
MemMaker restarts your computer by itself, then restarts your computer by itself 305
Read the report and be proud 306
MemMaker killed my PC! 307

Chapter 24: Cram More Data onto Your Disk with DoubleSpace and DriveSpace

Why should I compress my disk? 310
How disk compression works 310
Which do I have—DoubleSpace or DriveSpace? 311
Problems with DoubleSpace 312
Precautions to take before compressing 313
Now compress the disk 313
How to update from DoubleSpace to DriveSpace 316
What if the compressed drive isn't big enough? 317

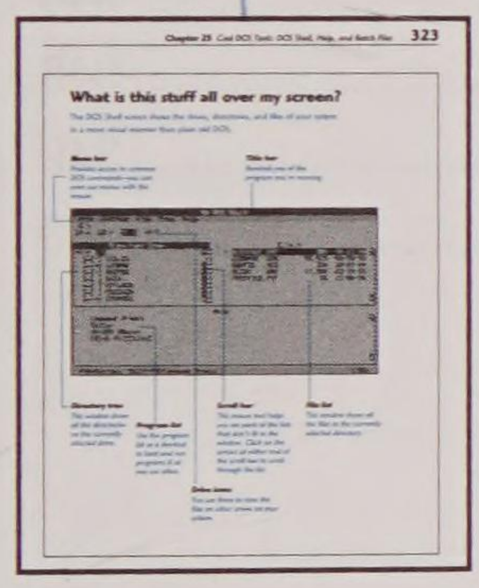
Why should I compress my disk?

see page 310

You can even compress floppy disks 318
What's good about floppy compression? 318
Okay, what's not so good about it? 318
Changed your mind? Get rid of the compression 319

Chapter 25: Cool DOS Tools: DOS Shell, Help, and Batch Files

The DOS Shell: A kind of DOS for the mouse 321
Why should I use the DOS Shell? 322
Here's how you start the DOS Shell 322
What is this stuff all over my screen? 323
Hey! I get to use my mouse? 325
Click a command, any command 325
File listings are a snap—without DIR! 326
It's easy to select files with DOS Shell 326
It's easy to use a menu command, too 327
How to get help when you need it 328
If you have MS-DOS 6... 328
Here's another version 330
Anybody can write batch files 330
Okay, show me an example 331
Why would I want a batch file? 332
How to name and run a batch file 332
Wait, now. AUTOEXEC.BAT is special 333
Some commands *only* work in batch files 333
Okay, how can I write a batch file? 334
A batch file that changes your screen prompt 335


Chapter 25 Cool DOS Tools: DOS Shell, Help, and Batch Files 323

What is this stuff all over my screen?

Chapter 26: Troubleshooting Tips That Anybody Can Try

Four major reasons computers don't work 338
Human error 338
Software 338
Viruses 339
Hardware 339
My DOS commands don't work 341
I hate this stupid syntax thing! 341
Check the path 342

This lousy program doesn't work! 342
Can't get in 342
Can't get out 343
Where's my file? 344
Try DIR 345
Try UNDELETE 346
Try UNFORMAT 346
Try Restore 346
I think it's dead 346
The screen is blank 347
This mouse has a mind of its own 347
It just won't start! 348
It says it can't find the hard disk? 348
My computer can't read my floppies 348
What is with this printer?! 349
Can someone help me? 350

Where's my file?

see page 344

It just won't start!

see page 348

Part VII: Reference Stuff

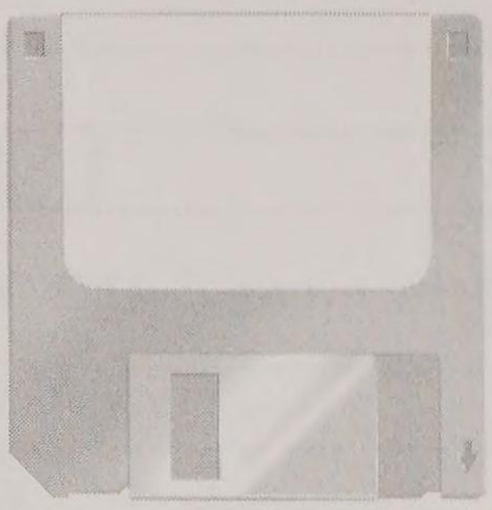
Chapter 27: Mini Command Reference

Commands that work with files and directories 352
Commands that work with disks 357
Commands that work with the system 359
Accessory programs 362

Chapter 28: Oops...What's This Error Message? **365**

Glossary **389**

Index **405**



Introduction

Think of your computer as a car. You don't actually have to get out and move the tires to go a certain direction, right? No, you turn the steering wheel. In the same way, you don't have to physically manipulate the disks and chips and boards in your computer. You tell DOS what you want to do—using the keyboard, mouse, and so on—and DOS gets it done.

The communication goes both ways, too. If something goes wrong, DOS tells you with a warning message or a beep, just like your car displays warning lights on the dashboard.

Anybody (including a child) can *operate* a car. Just turn on the ignition, push the pedals, and turn the steering wheel. It might crash, but then again, maybe not. It takes somebody with a little more knowledge than that to *drive* a car, though. To use the car appropriately, you have to know when to step on the gas versus the brake and when to use the turn signal (and maybe the radar detector).

Anybody (including a child) can *operate* a computer. Just turn on the switches, press keys on the keyboard, and move the mouse around. Just as with the car, it might crash, but then again, maybe not. It takes somebody with a little more knowledge to really *use* the computer. You have to know when to COPY versus MOVE files and when to use BACKUP (and maybe DEFRAG).

That's why we put together this book about DOS. Even if you already use a computer every day at home, school, or the office, this book can show you how to do it better. How not to run out of disk space (think of it as fuel for your computer, and you'll see why that's important). How to prevent computer viruses from infecting your disks and equipment. How to recover from the accidents you're bound to have (oops, I erased the file I needed).

What makes this book different?

This book assumes that you've already mastered the *really* hard things in life, like raising kids, running a business, killing crabgrass, cooking a soufflé, and maybe even programming a VCR. You're an experienced computer user but not a computer expert—nor do you want to be.

In the pages that follow, we tell you just what you need to know without all the technical mumbo-jumbo, the zillion ways to do the same thing, the mass of nonessential details. After all, you're not studying for a degree in computer science—you're trying to get some work done! You can think of this volume as the ultimate "quick-answer" book for anyone who uses a computer—at work, at home, or at school.

How do I use this book?

This isn't a textbook. You don't have to start at page 1 and read all the way to the end. It's not a mystery novel either, so if you want to skip to the last chapter first, help yourself. Keep in mind, though, that the chapters are in a logical order, building from "sort of novice" in Chapter 1 through "pretty experienced" in the later chapters. Even if you're familiar with some commands or already write your own batch files, you'll probably learn something by reading the early chapters first.

You'll also be surprised at some of the powerful things that you can do with DOS. That's why, if you have the time, it's worth flipping through the chapters, looking at the headings, and searching out the references to the things you do. The people who published this book went to a lot of trouble to make sure that those interesting ideas would leap off the page and catch your attention as you browse.

How this book is put together

For easy reference, the text is divided into eight major parts that run the gamut from basic stuff you absolutely need to know about DOS, to what the

heck this crazy message on your screen means. These parts are listed in the following pages with a brief summary of their contents.

Part I: Getting Started with DOS

Chapter 1 explains what DOS is all about. What DOS actually *does* with the computer, and some of the important equipment in your computer that you need to know about. Chapter 2 gives you a chance to try your hand at controlling DOS, using simple, safe commands to give you some experience and confidence.

Part II: How to Work with DOS Files and Directories

Chapters 3 through 9 explore crucial DOS concepts—files, directories, and drives. Did you ever lose something you typed into your computer? Where did it go? These chapters explain what happens when DOS stores information, so you won't lose any more information. You'll get familiar with DIR and COPY, two of the most common DOS commands.

These pages also give you some good advice on naming files and directories, explain how to find missing files, teach you how to move files from one place to another. You can even create an emergency boot disk to restart your computer if something goes wrong. (It's like having an extra ignition key in case yours breaks.) Get rid of data you don't need any more. And Chapter 8 shows you how to get stuff back that you didn't *mean* to delete. (Oops.)

Part III: Preventive Maintenance for Your PC

Every computer is subject to wear and tear, fire, viruses, and the occasional lapse of user sanity. Do you know how to recover from disaster? Better yet, how to *prevent* it? Chapters 10 through 16 prepare you for danger, and help you use your computer more efficiently while you're at it. You learn how to protect your PC from viruses, how to defragment files, what to put in a

startup file, and when to use a disk cache. If disaster strikes, those backups you made (with the help of Chapter 12) can help get your system back up to speed.

Part IV: Using Other Programs with DOS

Although you can do a lot with DOS, most people use software to do even more: word processing, spreadsheet calculations, drawing, and so on. Even games. Chapter 17 explores some of the many types of software that are available for PCs. Chapters 18 and 19 help you get that software up and running.

Part V: What about Windows?

Dashboards can be covered with leather, vinyl, plastic—even fur! If you want to make your computer's dashboard (DOS) more attractive and maybe even easier to use, Windows might be the ticket. Instead of learning what to type at the DOS prompt, with Windows you can choose commands from menus, or use your mouse with on-screen pictures to start programs or deal with files. Chapters 20 through 22 explore some of the cool things about working with Windows, and even show you how to get back to DOS from Windows if you need the command line to get something done.

Part VI: Making Your Computer Work Faster and Smarter

Everybody can use this section. MS-DOS actually arrives with a bunch of tools you can use to improve how your computer works. Chapters 23 through 26 explain how to use MemMaker, DriveSpace, DOS Help, and more to really improve your computing power.

Part VII: Reference Stuff

Sometimes you're not sure what command to use, or what a command does. Chapter 27 is a mini-reference to most of the DOS commands you'll ever want to use. On the other hand, sometimes you don't understand what DOS is trying to tell *you*. Chapter 28 gives you an alphabetical list of typical DOS error messages, and what probably happened to cause them.

Glossary

This book tries to avoid using computer "jargon." We keep it simple, using terms almost anyone would understand. But sometimes there's no "real world" equivalent for something. Like *RAM cache*. Then you may need to consult the Glossary for a quick definition!

Need more information? Try these other books

This book gives you a lot of information about how your PC works and how you can use it. As you become more comfortable with your computer, you may need a more complete reference book on DOS, Windows, or other subjects. Que has books on a large variety of subjects and in a wide range of series for different users. These are a few you may find interesting and useful:

- *Computers Illustrated*
- *Upgrading Your PC Illustrated*
- *Using Your PC*
- *Using MS-DOS 6.2*, Special Edition
- *Using the Internet*
- *Windows QuickStart*, 3.11 Edition
- *Windows VisiRef*, 3.11 Edition
- *Using Windows*, 3.11 Edition, Special Edition
- *Que's Computer User's Dictionary*, 5th Edition

Que also publishes multiple books on most major software products, including Microsoft Office, WordPerfect, NetWare, Lotus 1-2-3, and more. For more information on purchasing Que books, call toll-free 1-800-428-5331.

Information that's easy to understand

This book contains a number of special elements and conventions to help you find information quickly—or skip stuff you don't want to read right now.

(Tip)

Tips either point out information often overlooked in the documentation or help you use your PC more efficiently. Some tips help you solve or avoid problems.

{Note}

Notes contain additional information or "reminders" of important information you should know.

<Caution>

Cautions alert you to potentially troublesome situations or activities. In general, the text will warn you of things you need to avoid doing.

Q&A

What are Q&A notes?

Cast in the form of questions and answers, these notes provide you with advice on ways to avoid or solve common problems.

Plain English, please!

These notes explain the meanings of technical **terms** or computer **jargon**.

Sidebars are interesting nuggets of information

Sidebars provide interesting, nonessential reading, side-alley trips you can take when you're not at the computer or when you just want some relief from "doing stuff." Here you may find more technical details, funny stories, personal anecdotes, or interesting background information.

Watch for different typefaces. Stuff in a `special typeface` indicates what you see on your screen. **Bold** indicates new terms that you need to know or stuff that you type. Every once in a while, you'll see underlined letters in Windows commands; pressing these letters while holding down the Alt key is a faster way to use the commands.

1 First Things You Should Know about DOS

Think of DOS as the general contractor for your computer. DOS makes sure all the parts of the PC work together to get the job done the way you want it.

In this chapter:

- What's the big deal about DOS, anyway?
- Why you can't pretend DOS doesn't exist
- Who's in charge here? Me or DOS?
- Some little details to help you understand DOS and your computer

The general contractor at a building site makes sure the framers, the plumber, and the electrician show up when they're supposed to, get the job done to spec, and stay out of each other's way. Of course, if you sit back and give the contractor your blind trust, you may end up with higher costs or shoddy workmanship. Likewise, the same is true of DOS. The more you know about DOS, the higher quality results you'll get from your PC.

What is DOS anyway?

You pronounce it as a one-syllable word that rhymes with *moss*. **DOS** stands for **disk operating system**, and that's exactly what DOS is. It's a bunch of software programs that operate your computer so you can get some use out it. (Of course, it's a *bit* more complicated than that, as you'll learn from reading this book.) DOS is always there working in the background, even when you see something else on your screen.

Without DOS, your computer system is just a hunk of plastic filled with boards and wires, connected to other hunks of plastic filled with boards and wires.

Here's what DOS does:

- DOS tries to understand you and help you understand your computer.
- DOS helps you organize the stuff you type into your computer.
- DOS makes sure the different hardware parts of your computer can talk to each other.
- DOS makes sure the different software programs on your computer can talk to the hardware, and to you.

Plain English, please!

If it's attached to a computer and you can see it, feel it, or be electrocuted by it, then it's probably hardware. **Hardware** is a general term for the *physical* parts of the machine, like the screen, keyboard, printer, etc.

There's more than one kind of DOS

Over the years, different companies have written and sold their own disk operating systems, each with its own differences or improvements. Usually these different DOSes are written for specific types of computers by their manufacturers, and are licensed from Microsoft. For example, IBM has sold PC DOS for years and Compaq includes Compaq DOS with its machines. For the most part, there is very little difference between these operating systems and the original (and largest selling) MS-DOS from Microsoft; so this book will simply lump them all together and call it MS-DOS.

There are however, a few operating systems out there that use the word *DOS*, and aren't really the same program at all. Examples of these are Novell DOS, DR DOS, and 4DOS. They are replacements for the original MS-DOS and are sold as competing operating systems. You'd know if your computer uses one of these operating systems because they announce their presence on the screen whenever the PC is turned on. Because these programs are so different from MS-DOS, many of the commands in this book simply won't apply.

So what good is DOS? What does it do for me?

When you're building a house, you don't have to keep track of all the 10-penny nails and two-by-fours and sheets of insulation. And you don't have to hire individual carpenters, bricklayers, plumbers, and so on. The contractor takes care of all that. The workers come to the site every day expecting to have equipment and supplies as needed and in working order; and that's also handled by the contractor. Well, you can rely on DOS for the same kind of service as your contractor.

DOS tracks and controls the hardware

One of the first things DOS does when you turn on your computer is check to make sure all the hardware is connected and working. The hardware is like

DOS isn't the only operating system in town

DOS has become the largest-selling operating system because it was selected as the "new standard" for personal computers way back in the late 70s by IBM. Other operating systems abound though, and the users of each one will always try to convince you that theirs is *the best.* Warning: Don't even bring up the subject with a Mac user. They can get very snooty.

Macintosh computers use an operating system called **System 7**, which is graphical. That means you point to little pictures with a mouse and click a button to give commands to the computer. System 7 is only available on Macs, but other graphical operating systems can be purchased for the PC. For example, IBM is currently touting **OS/2** as the PC operating system for the future. Time will tell if this is true, but for now, DOS is installed on about 90% of the world's small computers.

Even Microsoft offers its own graphical operating system called **Windows**. With the power of Microsoft's marketing behind it, Windows version 3.1 has taken the PC world by storm. Interestingly, Windows uses DOS in the background and simply puts a **graphical interface** between you and the real DOS in the background.

the supplies and equipment for building the house. DOS keeps track of everything contained in or attached to your computer—disk drives, keyboard, monitor, mouse, printer, everything.

{Note} In this book, and throughout the computer industry, the terms **screen**, **display**, and **monitor** are used pretty much interchangeably.

Do you know what a plumb-bob is? How about the difference between an awl and a sander? You don't need to know that stuff because you hire experts to build your house. Well, because of DOS, you don't need to learn complex programming languages to get your hardware to work. DOS takes care of that. When DOS is running:

- The words you type at the keyboard find their way to the screen.
- The computer knows how to get information to the printer.
- The printer understands which file to print.
- The computer can learn to use a mouse or communicate through a modem.

DOS keeps the software in line

Software is a general term for any computer program that provides instructions to control what a computer does. DOS itself is software, remember? Think of software as the door handles, carpet, windows, and other things that customize the house and make it useful. The software in your computer probably differs from your neighbor's software—even if you both have the same kind of computer. (Even if you have the same floor plan, you've probably decorated your houses quite differently.)

Here are some of the things DOS ensures for your software:

- Your word processing software can open and print a letter or other document.
- The printer can find all of the typefaces it needs.
- Your software programs can access the memory they need to run.

DOS stores your information and helps you find it again

You use your computer for working with **information**, also called **data**. The letters and memos you type are data. So are the spreadsheets and address files you keep. What good would the data be if, once you typed it into the computer, you could never get it out again?

DOS makes sure your data is organized, so when you need it, you can use it. Thanks to DOS, you can print letters, make copies of your expense reports, and send messages to your brother in Iowa.

The following are some of the things DOS does with your data:

- Organizes your data in files
- Stores the files on whatever disk you choose
- Keeps track of where on each disk the files are stored

DOS helps you talk to your computer

DOS is the interface between you and all that hardware on your desk. This is the most important thing DOS does as far as you're concerned. It acts as your simultaneous interpreter, so you can talk to your computer system without too much trouble, and your computer can talk to you.

Plain English, please!

An **interface** is the means that two things use to communicate with each other. You interface with your microwave oven through its numeric keypad. Your VCR interfaces with your TV through a wire in the back of the set. Your computer interfaces with practically everything (including you) through DOS.

Here are some things DOS does for you:

- It makes sure the rest of the computer system understands the commands you type.
- It sends you messages about things going on inside your computer.
- It does its best to help you avoid mistakes.

You command and DOS obeys

To tell DOS what you want to do, you enter a **command**. DOS has well over 100 commands, but you'll probably never use more than ten with any frequency. DOS commands are generally made up of a single word—the command name—followed by other stuff DOS needs to get the job done—called **switches** and **parameters**. You enter commands into DOS by typing them, and then pressing the Enter key.

The command name is supposed to help you understand what the command does. For example, COPY is the command for copying a file, and MOVE is the command for moving a file. Some commands are a little harder to figure out because they use abbreviations to save on typing. Table 1.1 gives you an idea of some of the most commonly used DOS commands. (You'll learn more about all this stuff in Chapter 2, "Time to Jump in with Both Feet.")

Table 1.1 DOS Commands You Just Have to Know

Command	What it does
DIR	Shows you a directory, or listing, of file names on your disk.
COPY	Makes copies of files, on another disk for example.
MOVE	Moves a file to a new location. Used when you're cleaning up your filing system.
HELP	Gives you help about how and when to use other DOS commands.
DEL	Deletes, or erases, old files you no longer want or need.
UNDELETE	Oops! If you use DEL accidentally, then this is a good one to know.

Command	What it does
FORMAT	Prepares a new floppy diskette for its first use and also erases anything that was on it.
UNFORMAT	Oops! When you accidentally format a disk that had data you really need, this gets it all back.
TIME	Lets you set the computer's internal clock.
DATE	Works just like the TIME command, except that computers have internal calendars too.

You have to play by the rules

DOS is very picky about the way you enter commands. If you don't type something just right, DOS won't do what you want. To type something just right, you have to follow the DOS rules of syntax.

Plain English, please!

Syntax defines the way you have to enter the command, switches, and parameters. You have to spell the command correctly, leave spaces in all the right places, and provide all of the information DOS needs in the right order. It's not as hard as it sounds. (It's sort of like learning which end of a tool to use for what.) You'll learn more about syntax and typing commands in Chapter 2, "Time to Jump in with Both Feet."

Important things that are part of your PC

Because one of the things DOS does is control the flow of information in and out of your computer, you need to understand some of what goes on inside and outside the PC. It's not a good idea to take the cover off a PC unless you know what you're doing, but if you ever notice someone doing it (on his machine, not yours!), go ahead and take a look. It's pretty cool. You'll see **chips**, **boards**, and other stuff. The most interesting things to look for are the **CPU** and **RAM chips** and the **disk drives**.

> ***Plain English, please!***
>
> A **chip** is the usual term used instead of **microchip**. A microchip is a grayish, flat block, probably about an inch across or smaller, that is jam-packed with hundreds of thousands of transistors. This micro-miniaturization is what makes really powerful computers fit onto a desk top (or a laptop). Because these chips are so small and sensitive, they are usually mounted on larger circuit boards that can be plugged in or exchanged easily in the PC.

{Note}

This book doesn't cover a lot of hardware information, because you don't really need to know a lot about your computer's equipment to use DOS effectively. (We'd rather give you plenty of useful information about DOS instead.) The following hardware discussion just covers basic information you need to know to use DOS with the hardware.

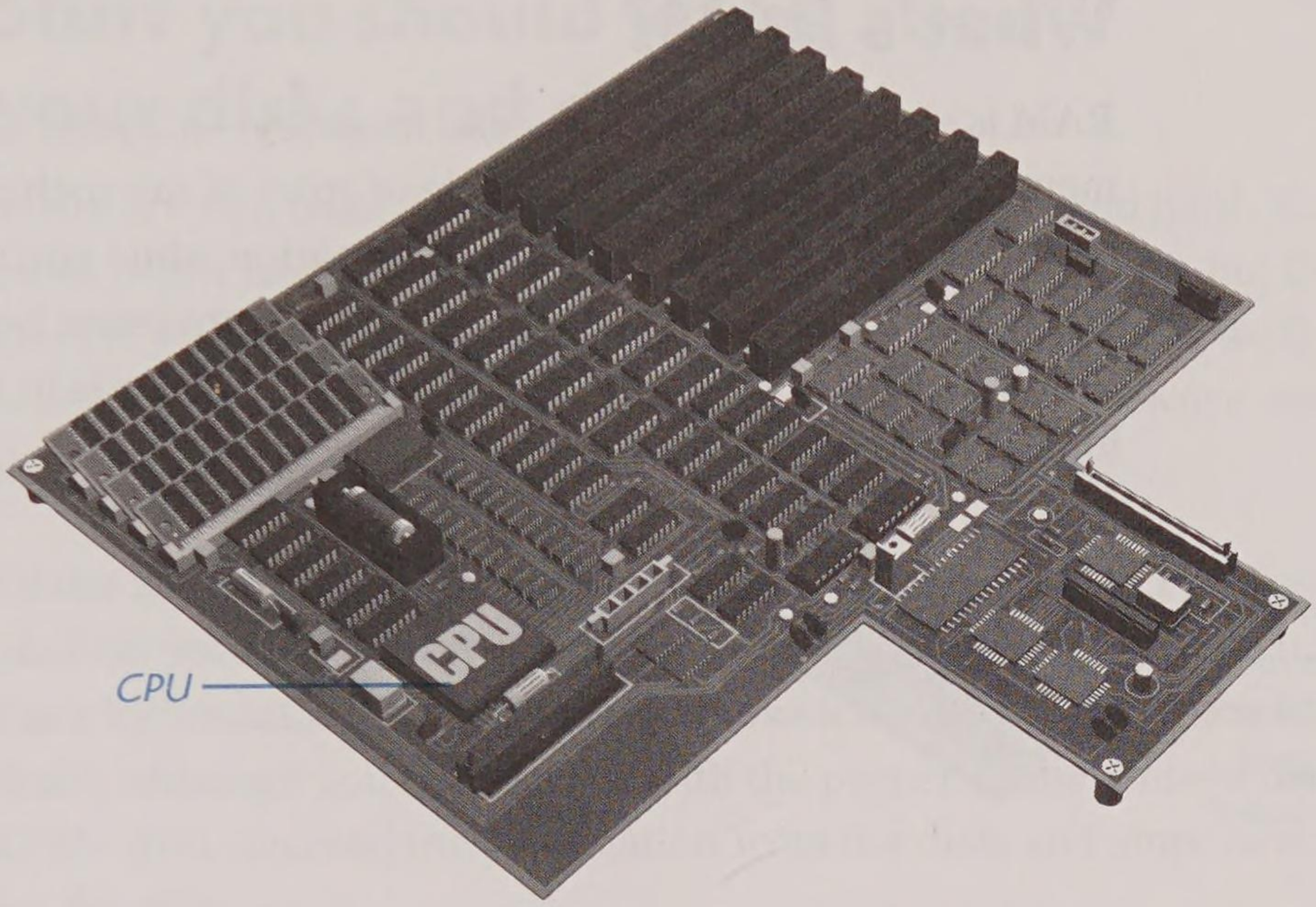
If you'd like a book that provides plenty of juicy details on hardware, see Que's *Using Your PC*.

The CPU is the brains of your computer

DOS controls the flow of information through your CPU. The CPU lives on a really big printed-circuit board in the bottom of the PC, called the **motherboard**. The CPU, under DOS's supervision, "directs traffic" and performs calculations on all the information flowing through your computer. Figure 1.1 shows a typical computer motherboard with CPU and other goodies.

> ***Plain English, please!***
>
> CPU stands for **central processing unit**. The CPU is the brains of your computer—it does all the actual processing. It is a microchip about one inch square with the equivalent of about 1,000,000 transistors embedded inside. The CPU is sometimes called the **microprocessor**.

Fig. 1.1
Although the actual location may vary from computer to computer, the CPU is generally located on the motherboard of the PC.



Is there more than one kind of CPU?

Yep. All **IBM-compatible** PCs (that is, IBM computers and any PCs that work just like them) are based around a microprocessor manufactured by the **Intel Corporation** (or a copy of an Intel chip manufactured by another company). Every few years, Intel comes out with a new, improved model. Generally speaking, the improvements allow the CPU to handle more data, and to perform faster.

The first PCs used a chip called the 8088 (pronounce it *eighty eighty-eight*). The next incarnation was the 80286, but most people just call it the *two eighty-six*. More commonly found now are the 80386 and 80486 processors. Currently, Intel is marketing its **Pentium** chip, which is really a 586 with a fancy name.

In the last few years, the model number issue has been clouded by the release of SX and DX versions of each chip. If a CPU were a car, an SX chip would be the stripped-down "sports model" and a DX chip would be the "deluxe" version with all the fancy options.

What's RAM?

RAM is short for **random-access memory**—it's your computer's short-term memory. RAM consists of a couple of rows of microchips on your PC's motherboard that holds all your information while you're working. When you type a letter, the characters on your screen are being held in RAM. The word processing program that you use to type the letter is in RAM too. To get a look at RAM, glance at figure 1.2.

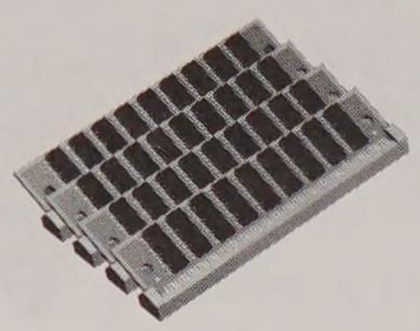


Fig. 1.2
RAM chips generally come stacked in rows on little circuit boards that can be plugged into the motherboard in one step.

Pretty powerful stuff this RAM. But it has a weakness. RAM is electronic, which means it requires electricity. If the power is turned off unexpectedly, then RAM instantly forgets all your work.

To avoid losing all your work when the PC is turned off, you have to save it on a computer **disk** (a hard disk or a floppy disk) or a **tape**. Almost every software program ever written has some kind of a Save command. Remember, disks and tapes are for permanent storage, while RAM is only for temporarily holding things while you're working with them. Read Chapter 23, "Make the Most of Your Memory with MemMaker," for a more in-depth look into computer memory.

Okay, that's RAM. So what's ROM?

ROM stands for **read-only memory**. It's another type of memory chip your computer uses. DOS uses ROM, but you don't. You never need to think about ROM. Whenever you see the word *memory* in this book, it means RAM.

Stuff you should know about your disks and drives

There are two basic kinds of disks and drives: floppy and hard. Your computer might have a CD-ROM drive, too, or even a tape drive, but these are *special purpose* drives that will be discussed later. For now, we'll confine ourselves to the two main types of drives that every PC owner uses every day.

Disks are the things you store information on so it doesn't get lost when you shut off your computer. Think of disks as your PC's filing cabinet. Disks store their information *magnetically*, just like a tape recorder. The information is there, although you can't see it. With the proper equipment—a disk drive and DOS—you can read the information from the disk, and store new information on the disk.

Hard disks have two major advantages over floppies:

- They are much faster at reading and recording data.
- They hold a ton more stuff.

Floppies have one advantage over hard disks:

- You can pop them out and take them with you. Hard disks are usually permanently installed inside the computer case.

Disks are discussed in more detail in Chapters 5, "How to Examine the Files on Your Disk," and 6, "DOS Stuff You Can Do with Disks."

Plain English, please!

A **disk drive**—or just **drive**—is a hardware device that writes information onto a disk and can read that information back again later so that the computer can use it.

The keyboard is for two-fisted typists

Your keyboard is the way you actually talk to your PC and DOS. If you've ever used a typewriter, then a lot of the keys will be familiar to you. They won't necessarily work the same way, but at least they're familiar.

When you press a key, the corresponding character appears on your screen (that's DOS at work!). On your screen, a flashing bar called a **cursor** shows you where the character will appear.

Plain English, please!

The **cursor** is a flashing underscore character on the screen that marks where text will appear when typed. On some computers, the cursor may be a small solid box. In some programs, the cursor appears as a flashing vertical bar *between the letters on the screen;* then it's called an **insertion point**.

There are two different keyboard layouts commonly used today. The older one, called the **Classic keyboard**, has 84 keys and 10 function keys. The newer model has 101 keys and 12 function keys (or so). This **Enhanced keyboard** stops resembling a typewriter the second your eyes scan past the letters. Most of the other keys are shortcuts to commands or provide functions that a typewriter's keyboard can only dream of.

Here's a crash course on using your keyboard with DOS. You'll see these terms thrown around a lot in this book:

- The **Enter** key is the key that sends your command to DOS to be processed. Until you press it, the machine will stare at you as if to say, "Well?"

(Tip)

You might have two Enter keys on your keyboard—one just to the right of center and another at the far right. They both do exactly the same thing. Your Enter key also might be labeled "Return" or just be a big key with one bent left-pointing arrow.

- The **function keys** are all the keys with the "F" on them, followed by a number. DOS doesn't use them much, but they come in handy with other programs.
- **Alt** and **Ctrl** are special purpose keys. Alt is short for "alternate," but everybody just calls it, "Alt." Ctrl is short for "control," but everyone calls it, "Control." These keys, like the Shift key, don't do anything by themselves. You use them like Shift to give a different meaning to some other key. (Pressing more than one key at a time is called a **key combination**.)
- **Esc** is pronounced *escape*. It's a good one to know. In DOS, it lets you completely erase a line you just typed (as long as you haven't pressed Enter). In other programs, it's usually the way to back out of something you're not sure about.
- **Cursor-movement keys** are the four arrow keys you use to move the cursor on your screen up, down, left, and right.

Time to Jump in with Both Feet

You can use a dishwasher and a microwave oven, right? So, you can use a computer. All it takes is a few keystrokes and you've entered your first DOS commands.

In this chapter:

- You can't use it 'til you turn it on
- DOS is there, somewhere
- You already understand syntax. Really!
- And you thought typing commands would be hard
- What if nothing happens?

In this chapter, you'll get your feet wet and actually see DOS at work. Don't be put off by the stories you've heard about how much computers cost, and how smart they are, and how someday they'll rule the world. In reality, the PC on your desk is just another household appliance.

Just as there is no key on the keyboard marked "Explode," there is no DOS command that does this either. The biggest obstacle that faces new DOS users is their fear of breaking something. Remember, DOS is going to take care of all the tricky things, and leave the fun stuff to you. You will have a very hard time hurting the machine!

Let's start at the very beginning

You can't get any more basic than an **on/off switch**. Every appliance has one, your PC included. If you are ever going to get started, you have to hit that switch and bring that computer to life. Look for the power switches on the main box and the monitor and turn them on.

Plain English, please!

Actually, nobody ever *turns on* a computer. They always **boot** or **boot up**. The term was coined many years ago and refers to "pulling yourself up by the bootstraps." If you have to turn your computer off and then on again to reset it, this is called **rebooting**. Because the power was actually turned off for a few seconds, it's also known as a **cold boot**. If you reset the machine by pressing the Reset button, or by pressing the Ctrl-Alt-Delete key combination, this is called a **warm boot** because the machine stays on all the time.

Here's what the power switch might look like:

- A push button
- A switch that flips like a light switch
- A switch that rocks (called a **rocker switch**, by the way)

Don't confuse the power switch on the display with the brightness controls, or you'll never see anything! The monitor's power switch probably has the same O/1 symbol as the switch on the PC. Brightness controls are usually knobs that roll smoothly back and forth.

(Tip)

Although there is no technical reason to do one before the other, many people like to turn the monitor on first. That way it's all warmed up, and any messages displayed by the computer can be seen while the machine boots.

Here's DOS

Once the power is turned on, this is what happens:

- You hear whirring noises, a "gronk," and a beep or two.
- You see lights.
- All sorts of messages start flashing on your screen.

Ignore this stuff for now. What you're interested in is the last line of the display—the **DOS prompt**. It looks kind of like this:

```
C:\>
```

For all intents and purposes, this little symbol is what DOS looks like. It's DOS's way of saying, "I'm here. I'm ready. Tell me what to do." Take a look at figure 2.1 to see a typical DOS prompt.

Switches almost never say "On" or "Off"

Most computer power switches use the computer symbols for on and off—**1** for "On" and **O** for "Off." The power switch on my monitor is a push-button with a **1** *inside* an **O**. This means, "Push once for ON. Push again for OFF."

I also have a European food processor that has the same markings. I nearly killed myself the first time I tried to use it. I thought the one meant that the blade was standing still and the zero meant it was spinning around.

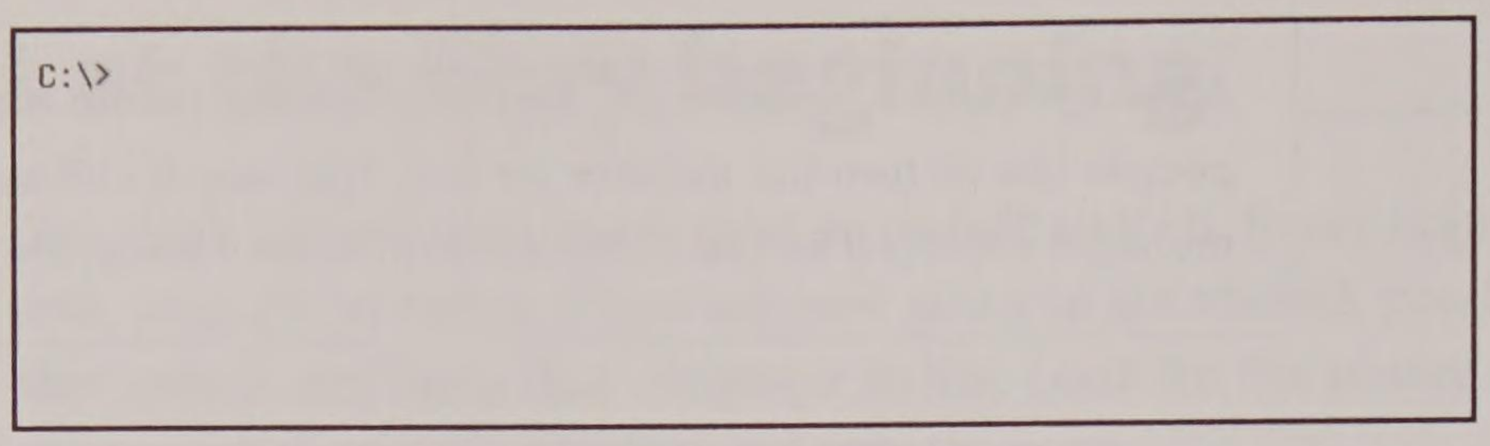


Fig. 2.1
DOS doesn't look very exciting. It's basically just a prompt on an empty screen.

{Note}

Your prompt may not look *exactly* like the one used here, but what we're hoping for is at least a letter of some kind, followed by a >, with a cursor flashing beside it.

Plain English, please!

The **DOS prompt** is a symbol that DOS displays on your screen when it is ready for action. Usually, but not always, the prompt includes a letter, a colon, a backslash, and a greater-than sign (>) like this: C:\>. The line on which the DOS prompt appears—where you'll be typing commands—is called the **DOS command line.**

Where's DOS?

If, after waiting a minute or so, you don't see anything at all on your screen, or you see something that is obviously not a DOS prompt, it's time to trouble-shoot. Don't panic! Here's what you should do if DOS doesn't start:

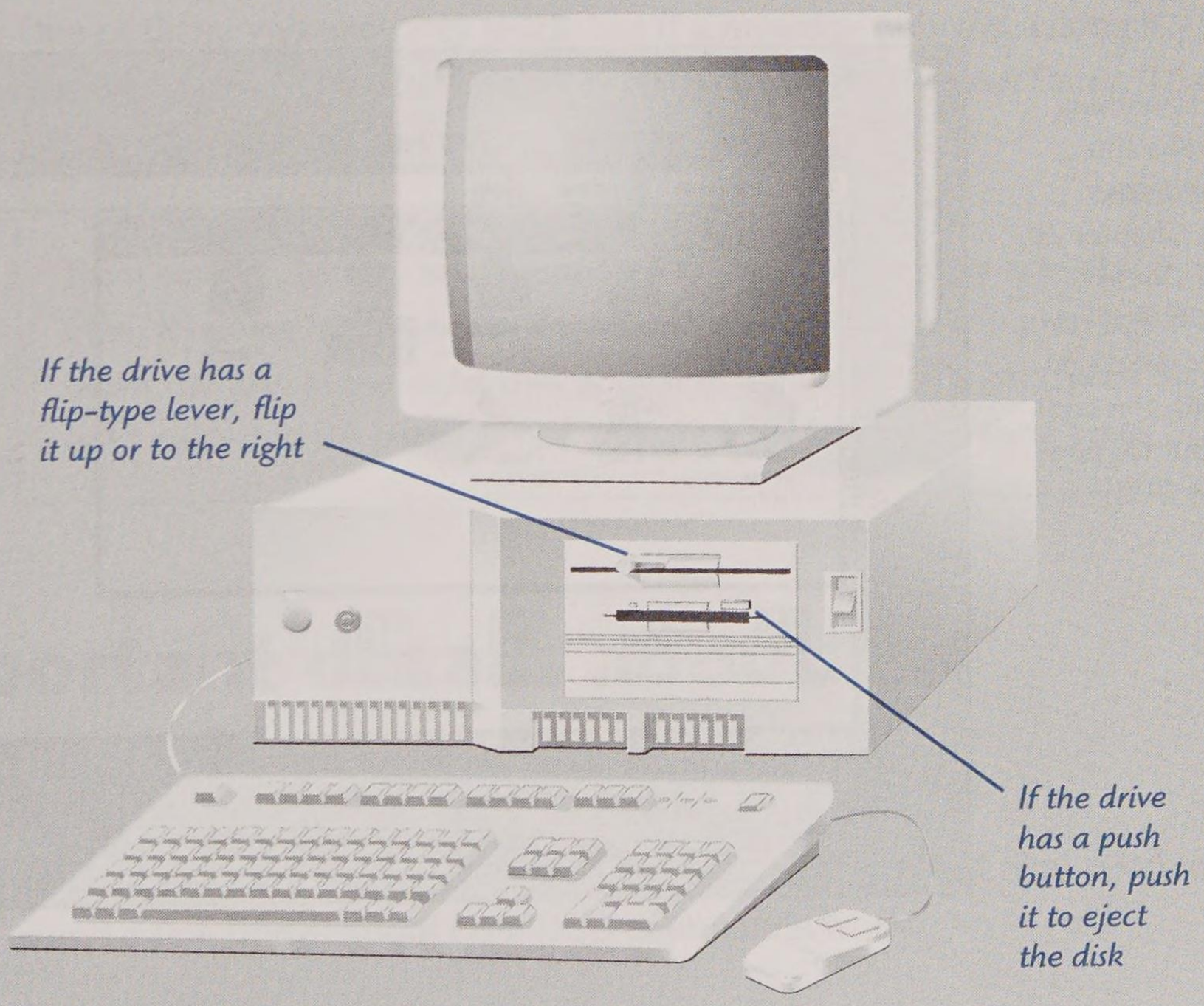
- Check the power wires. Computers light up like Christmas trees when they're on. They have status lights showing if the power's working, if a disk drive is being used, and so on. If there are no lights on, there's a good chance you forgot to plug the thing in.

- Listen for signs of life. Computers that are working whirr, grunt, and groan like Uncle Bernie in the morning. If you hear noises, but nothing shows up on your screen, there's a good chance you forgot to turn the monitor on.
- Check to see if the display screen's power light is on. If it is, but the screen is totally blank, you probably have to adjust the brightness control.

How to remove a floppy disk

Don't try to just pull it out! Disks can only be removed when the **drive doors** are open. Do this:

- If there is a square button sticking out on the front of the disk drive, push it in to eject the disk.
- If there is a little flip-type lever across the front of the drive slot, gently give it a push up or to the right to open the drive door and release the disk.



- Read the screen. If it says `Non-system disk or disk error`, someone left a floppy disk in the disk drive. Take it out and press any key on your keyboard to get going.
- Read the screen again. If you know for sure that there is no disk in the disk drive and it still says `Non-system disk or disk error`, call for help. Your computer can't find DOS, which could mean trouble.

Something cool is on my screen and it's definitely not DOS

Many computers are set up to automatically start with an easy-to-use software program on-screen. If you see something on your screen with lots of color and maybe some pictures or pretty-looking text—like in figure 2.3—it's another software program or a maybe a startup menu. You will have to *exit* that program to get to the DOS prompt. How you do this depends on the program.

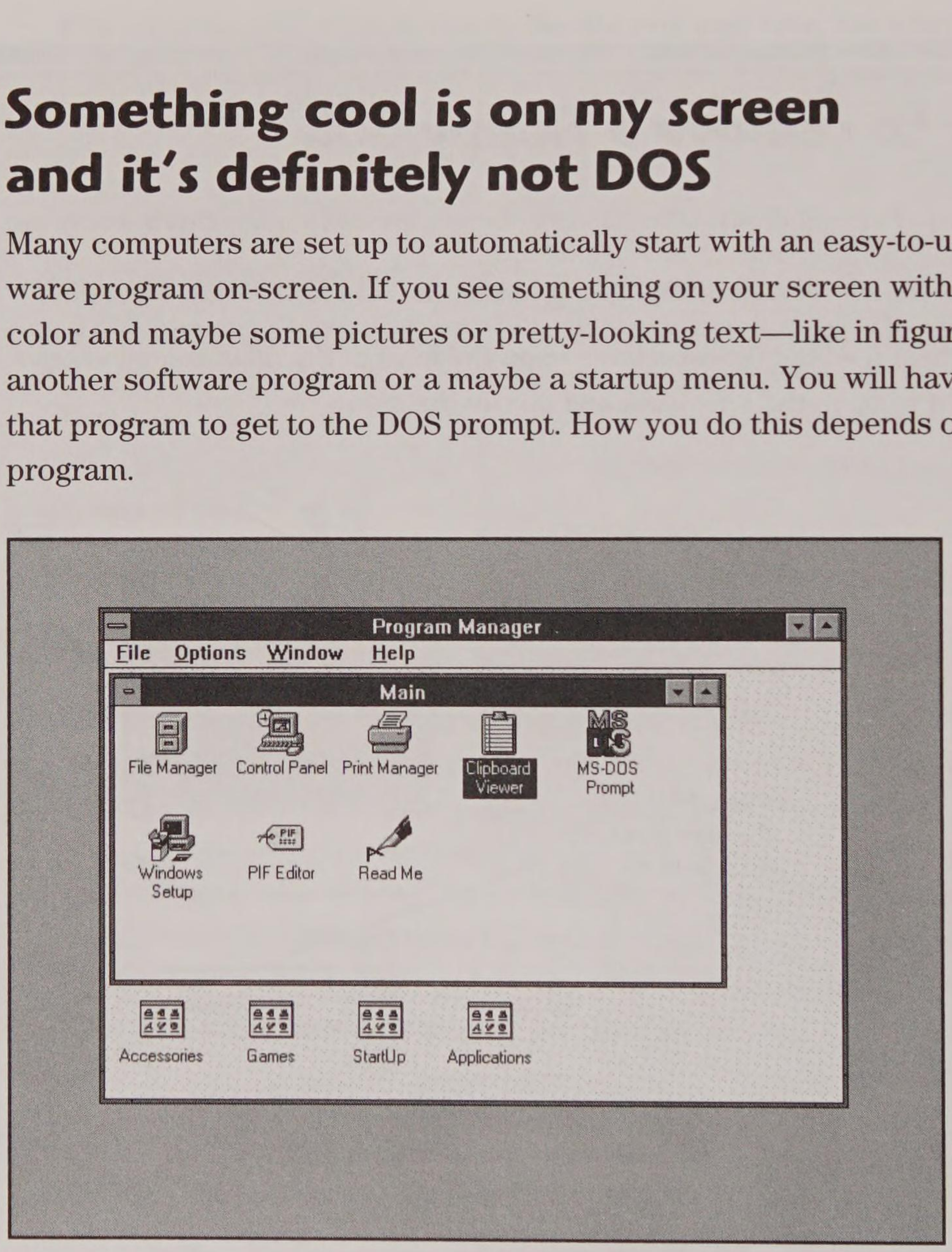


Fig. 2.2
If you get something that looks like this, you're in Windows. Check out Chapter 20, "Windows! Doesn't Anybody DIR Anymore?," for details on working with this cool program. But for now, get back to DOS.

You can either go through the steps for exiting every time you boot your computer, or you can go find the person who set up your system. Tell them to fix it so you stay in DOS, at least while you're working with this book.

Here are some things to try when you want to exit the program:

- Press and release the Alt key and the F4 key at the same time.
- Press and release the Alt key and the F key at the same time, then press the X key.
- Many menu programs will exit to DOS when you press function key F10. It can't hurt to try it.
- Look for something on your screen that says `Exit to DOS`, or `Quit`, or `Close`, or something like that. Press the up or down arrow keys on your keyboard until that `Exit to DOS` (or whatever) line is highlighted, or has a checkmark next to it, or something. Then press Enter.

One of these will probably work, but if a message appears asking if you are sure you want to quit (or exit, or close, or whatever) press Enter. That should bring you back to DOS.

From now on, when you are supposed to press two or more keys at the same time, it's going to be written like this: Alt-F4. Make sure you press and hold down the keys in the order they appear in the text. In this case, press Alt and hold it down, then press F4. Then release both keys at the same time.

Some important details about DOS commands

Before you start issuing commands to DOS right and left, you need to understand a few things about how DOS commands work.

Think of DOS as a little child. Kids are very literal. If you tell a two-year-old to get his shoes from his closet (not knowing they're on the bed), he won't come back with the shoes. He'll just say, "They're not there." DOS is just like that. Your commands will be followed *exactly*, which may yield some surprising results! Or no results at all. So you have to learn how to give the right commands in the right way.

Syntax is a complex term for a simple concept

You must type DOS commands *just so* in order for DOS to understand you. To get control of DOS, you have to use the right words in the right order. That's called **syntax** (pronounced SIN-tax).

If you said "Apple please green the get," nobody would understand what you were talking about. That's because the English language has its own set of rules (also called *syntax*) that govern how you put sentences together to make sense. Now, you can probably figure out how this sentence should work ("Please get the green apple") because you understand the language and the syntax rules. Also, you're fairly intelligent. Unfortunately, your computer can't understand garbled sentences and it isn't intelligent enough to figure out what you really mean. You have to follow the DOS syntax, or the computer won't understand what you want to do.

Each DOS command has its own syntax, and most of them follow a common pattern. At the DOS prompt, you always type the command word first, followed by a space, and then type whatever else the command needs to finish the job. We call this "whatever else" a **parameter** (pronounced per-AM-uh-ter) for the command. So the whole command ends up looking like this:

command parameter

That's not so complicated, is it? Here's a typical DOS command:

type autoexec.bat

It works because TYPE is a command that DOS knows, and AUTOEXEC.BAT is a file that it can find. A parameter can be a file name, a directory or drive name, a path to one of those items, and so on—whatever the command needs for DOS to carry it out. Don't worry; if DOS doesn't have enough information, DOS will tell you!

DOS is not **case-sensitive**. That means that DOS doesn't care whether you type in lowercase, UPPERCASE, or MiXeD cAsE. To keep you from having to use the Caps Lock or Shift key, though, this book will assume you want to type commands the easy way, in lowercase. That's the way you'll see them in the text, in boldface, so it's easy to pick out exactly what you're supposed to type. But if we're just *talking* about a command, it'll appear in uppercase, so you can tell it's a command. Look back at the paragraph right before this one to see what we mean.

Plain English, please!

When you give DOS a command and press Enter, that's called **running** or **executing** a command.

Command and parameter are pretty easy, too

Think of the command word, which always gets typed first, as a verb. You are, after all, commanding DOS to do things. Fetch! Cook! Format! Now think of the parameter as the object of the sentence. Fetch the stick! Cook a steak! Format this disk!

Just like an English sentence, all the words in a DOS command must have spaces between them. If you forget the space after FORMAT, DOS can't make out what you're saying, because it knows how to FORMAT, but nobody ever taught it to FORMATA.

Some commands require two parameters. The two parameters have to be separated with spaces too, because otherwise DOS won't be able to tell when one parameter stops and the next begins. It would be like *runningallyourwordstogether*. When DOS understands the command, but can't decipher your parameters, you usually get a message along the lines of `Invalid parameter`.

Don't forget the switches!

At last we come to the **switch**, which is an optional letter that follows a slash. Think of it as an adverb that says how the verb is to be executed. Fetch the stick quickly! Cook a steak, medium rare! Format this disk, carefully! So the final version of the syntax line looks like this:

command parameter switch(es)

Many DOS commands allow the use of switches but you must never assume that each switch does the same thing for each command. After all, the term *rare* has a different meaning for a zoo than for a restaurant.

What happens if I don't type it right?

You should always be careful when typing commands in DOS. Read what you typed before you press Enter, because one slip and DOS can give you an unpleasant response:

- You could get an **error message** like `Bad command or file name`
- Or DOS could do *exactly* what you told it to do. This isn't necessarily good, especially if you told it to erase all the letters you typed yesterday. Oops.

Plain English, please!

Error messages are short little phrases that DOS throws up on the screen when it can't figure out what you typed. If you get an error message, then DOS didn't do anything and is waiting for you to try again. Bad command or file name means DOS doesn't understand the first command word. Anything else is usually a sign that your parameter was typed incorrectly. Check your spelling and make sure you have the right spacing between the words.

Now give DOS a try

Now that the DOS prompt is on your screen and waiting for you to do something, you may as well do something. Like type a command.

DOS has a few harmless little commands you can use to get your feet wet. To try the ones in the next couple of sections, just get to the DOS prompt, and follow the directions in the text. When you get to the end, you will have given DOS commands!

Find out what DOS version you use

{Note} The VER and CLS commands are completely harmless. You can use them at any time.

The VER command gets DOS to tell you what version of DOS is on your computer. This command is handy when you want to use more advanced DOS commands or DOS programs, but need to know which version of DOS you have. To use the VER command, type this at the DOS prompt, and press Enter:

ver

As soon as you press Enter, DOS reads what you typed, executes the command, and responds by displaying something like `MS-DOS Version 6.20` on your screen, followed by the DOS prompt again, like in figure 2.4.

```
C:\>ver

MS-DOS Version 6.20

C:\>
```

Fig. 2.3 It doesn't matter what version of DOS you have, this command should work.

Clear your screen

If you tried VER or some other command, did you notice how the command doesn't disappear after DOS executes it? It just moves up on the screen to make room for a new DOS prompt? That's what happens most of the time. Pretty soon your screen gets cluttered up with a lots of old commands. When you want to start fresh, you can clear your screen with the DOS CLS command, like this:

```
cls
```

All these years and they still can't get it right?

VERSION 6.22

DOS has gone through some pretty spectacular changes since it was introduced in the late 1970s. Every change requires a new version number as well. The higher the number, the more sophisticated the software version.

Version 1.0 was the first DOS for the IBM-PC and Version 2.0 was written when the hard disk was invented. Subsequent versions added more commands or added support for new and bigger equipment.

When just a few things change in the program, the whole version number doesn't change, just the number to the right of the decimal point. So, 4.1 is a later release than 4.0. In recent years, we have seen DOS versions 5.0, 6.0, 6.2, 6.21, and 6.22!

Then, press Enter. The old commands disappear, leaving the DOS prompt alone at the top of your screen. CLS is DOS shorthand for Clear the Screen. It doesn't hurt anything in your computer and really just tidies up a bit.

Q&A

I got the message, `Bad command or file name.`

Don't take it personally. Remember, this is just DOS's charming way of telling you that it doesn't understand. You get another DOS prompt right after the error message, so check your typing and try again.

Um, the computer doesn't seem to be working

Sometimes, for no apparent reason, the computer stops responding to commands. No matter what you do, nothing happens. In computer-speak, the system is **frozen**. A tell-tale symptom that the system is frozen is that the PC lets out a wailful beep every time you press a key.

There's only one thing to do: reboot. Think of it as restarting a stalled car. Here's how to reboot:

1. Take any floppy disks out of the floppy drives.
2. Press Ctrl-Alt-Del. (Hold down the Ctrl and Alt keys. Keep holding them as you press the Delete key once. Then let go of all three keys.) As mentioned at the beginning of this chapter, this is called a warm boot.
3. If step 2 doesn't fix the problem, and your computer has a button marked, "Reset," on the front panel, press it.
4. As a last resort, use the on/off switch to turn the computer off, then on again.

(Tip)

Some computers come with a lock and key that may get turned by you, a curious co-worker, or even the vibration of the machine. Most of the time, these are **keyboard locks** that simply disable the keyboard, although the computer continues to run. If your machine has a keyhole and the key is in it, you might want to make sure that it's turned to the unlock position.

3 Get Started with the DOS Filing System

In this chapter:

- Where do files come from?
- How do files get their names?
- The ABCs of disk drive names
- Directory trees grow from a single root
- If you can follow the directory path, so can DOS
- What's on my disk?

Think of your computer as a funny-shaped filing cabinet that also happens to calculate stuff. To use it right, you have to understand the filing system.

You know how some librarians can find any book anywhere in a four story library without batting an eye? They understand the library's filing system. DOS also has a filing system that it uses to store and recall all the information you enter. Until you learn how to use the filing system, all the letters, spreadsheets, and other stuff you work hard to create are hidden someplace where you can't get them. And the DOS filing system can be as baffling as the Dewey decimal system until you get the hang of it. Read on!

What is a file, really?

If all the information you ever typed into your computer was kept all mushed together, it wouldn't be much use. You wouldn't be able to separate the letter you wrote to your college roommate from last month's expense report. To help solve this problem, DOS insists that you organize your data into **files**.

> ***Plain English, please!***
>
> Just as the songs on a record are separated from each other so that you can play any one you want, DOS separates the information on a disk into **files**. If you want to keep a copy of a letter you typed, you must save it in a file. That way you can retrieve it or print it anytime you want without affecting any other files on the disk.

Although DOS is the program that actually stores and retrieves your files, you will probably use a word processor or a spreadsheet to enter the data into the computer in the first place. Once your letter or budget report looks the way you want it to, you tell the program to save your work in a file. Then, you give the file a name and sit back while DOS quietly records the information onto the disk in the background. You can use your new file again and again, as long as you remember what you named it.

(Tip)

Remember that DOS doesn't do anything without your say-so. You are the one that creates the files and names the files and tells DOS what to do with the files.

Can I name my file Fred?

Each file on a disk has its own unique **file name**, just like a library book has a name that identifies it. You make up the name when you create the file, and you have to tell DOS the file name whenever you want to work with that file.

So if you want to name your file Fred, go ahead. Name it Bill or George if you want. These are all perfectly good names because they follow the DOS rules of file naming. The rules are pretty simple:

- All files need a **first name** that can never be more than eight characters long.

> ***Plain English, please!***
>
> A **character** is any letter, number, or symbol. Look at the end of this list for specifics on what you can and can't use in your name.

- If you want, you can give a file a **last name**, also called an **extension**, but it can never be more than three characters long. Files don't absolutely *need* extensions, but they can be helpful. See the sidebar, "How extensions help you sort out your files."
- When you use a file name with an extension, you must type a period (.) in-between. This helps DOS know when the file name stops and the extension starts.
- Practically any character can be used in a file name. Letters and numbers are all good. Watch out for punctuation-type characters though, like commas, slashes, and backslashes. Some have special meanings for DOS (like the period and the blank space), so they are **illegal**. Although you can use some punctuation characters, it's like naming your child "5." Legal, but not advisable.

{Note} You should always try to use names that describe the stuff in the file. That way, you don't have to do a lot of guessing about which file is which.

<Caution> DOS doesn't allow you to have two files with the same name in the same place on a disk. If you try to use the same name twice, your first file might get erased.

Every drive has a name

DOS also likes to call your hardware by name. DOS names disk drives using letters of the alphabet followed by a colon. Here's how it works:

- The first floppy disk drive that DOS finds is always named A:
- If there's a second floppy drive, it will always be named B:
- If there is a hard disk, it will always be named C:

Simple, right? Maybe. Beyond C:, it's anybody's guess. Today's personal computer was designed for expansion and the human imagination has consistently shown no bounds. If you have a drive D:, it could be anything from a hard disk, to a CD-ROM drive, to an imaginary disk called a RAM disk, to another floppy disk.

Q&A

If I only have one floppy drive, is my hard disk named "B:"?

Nope. Your hard disk is *always* drive C:, no matter how many floppy drives you have. Lots of people are living perfectly productive lives with only an "A:" and a "C:". If you have a single floppy system, DOS will automatically *reserve* the letter "B:" for the day when you go out and get another drive!

How extensions help you sort out your files

File extensions come in handy for identifying files, or groups of files. Some extensions have kind of a universal meaning. For example, the extension EXE means the file is an **executable file**, used to start a software program. The extension TXT means the file is a **text file**.

Some programs automatically assign extensions to the names you give your data files. Microsoft Word (a word processor) adds a DOC extension. Lotus 1-2-3 (a spreadsheet) adds WK and a number (WK1, WK3, and so on). dBASE (a database) adds DBF. These extensions help you and DOS identify not only the type of file you are working with, but which program it goes with.

If you use a program that doesn't automatically add file name extensions to its files, then you can make up your own. You might want to come up with some standardized file name extensions, such as RPT for reports, Q1 for first quarter, and so on.

How to use drive names

DOS names disk drives so you can tell DOS where to look for files, or where to execute a command. If you want DOS to do something to a file on a floppy diskette in drive A:, you tell it to look in drive A:.

Here's how. Make sure there's a floppy properly inserted in drive A: and then type the simplest DOS command in the world:

```
a:
```

That's it, honest! When you press Enter, your DOS prompt will change to something like `A:\>`, like in figure 3.1. That means DOS is now looking at the disk in drive A:. Any command you type will affect disk A.

(Tip)

When you try this, use a floppy disk that has some files on it. You must have one somewhere. When you put the disk into drive A:, hold it by the label, with the label side up. Slide it in gently—no pushing or shoving allowed! If it's a 3.5" drive, you'll know it's in correctly when the little button on the drive door pops out. If it's a 5.25" drive, you'll know it's in correctly because you'll be able to push the little lever down to close the drive door.

```
C:\>a:

A:\>
```

Fig. 3.1
This command just indicates the letter of the drive where you want to work. Nothing to it.

Now, change back to drive C:. Type:

```
c:
```

DOS stops looking at the floppy drive A:, and your prompt changes back to the way it was before. Cool, huh?

(Tip)

You remembered to press Enter, didn't you? I'm not going to remind you anymore. If you see a command in boldface or on a separate line, and the text says to type it, always just press Enter afterward unless otherwise instructed.

You can divide your disk into directories

After a while, your disks are going to be chock full of files. And, no matter how descriptively the files are named, you and DOS are going to have a hard time keeping track of what's what. You could keep a list on a piece of paper, but then what's the use of having a computer?

Well, guess what? DOS's filing system comes with a built-in solution, called **directories**. Here's how they work.

First the drawers—called *directories*

Think of a disk as the filing cabinet where you dump all your files. One day, you start dividing the junk in the cabinet into different drawers. Voila! Organization! Now, you can store the files neatly grouped in drawers instead of in one big lump.

A **directory** is your file drawer. You can have as many as you want on your disk and you get to name them, too (using the same naming rules that you use for files). The end result is an organized, coherent filing system—well, theoretically. The computer is only as organized as your system.

Now what if the drawers had file folders inside?

Consider this. If you have a filing cabinet drawer labeled BUDGETS, you can divide that drawer in two parts and store files for this year's budget separately from files for next year's budget. On your disks, you can do the same thing. You can make a directory named BUDGETS, then make two directories that are **subdirectories** inside BUDGETS.

Start from the root and climb the tree

Actually, your disk already has a directory on it. DOS made it. It's called the **root directory** (or just **root**) and DOS refers to it by using the **backslash** (\). As you make directories, and more directories, and more directories, your DOS filing system branches out like a tree. Which is why the filing system is called the **directory tree** (or just **tree**). Look at figure 3.2.

{Note} Technically speaking, all directories you make are subdirectories of the root—they all grow out of the root. Most people use the terms *directory* and *subdirectory* pretty much interchangeably.

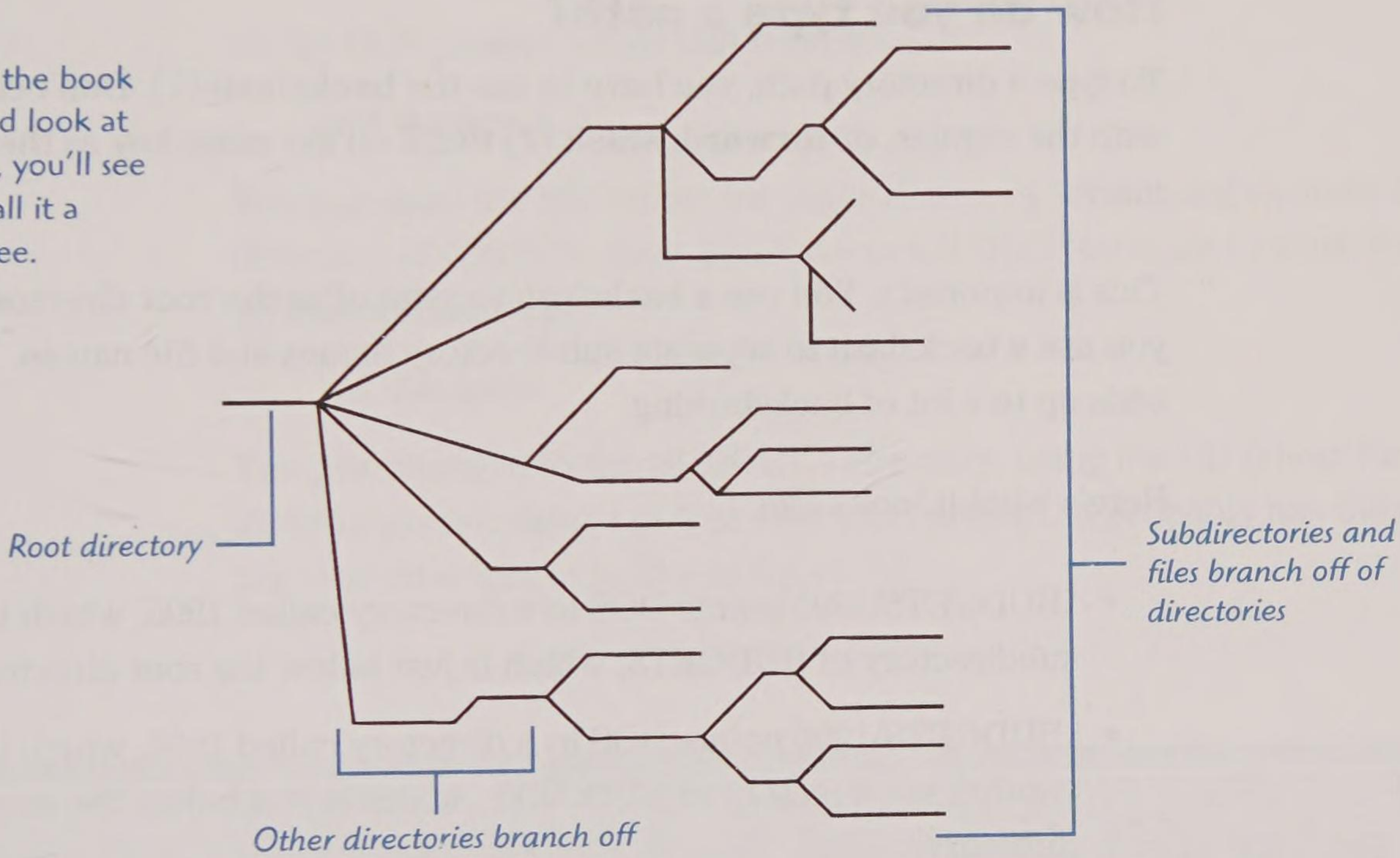


Fig. 3.2
If you hold the book sideways and look at this picture, you'll see why they call it a directory tree.

Or better yet, follow the path

Of course, the whole point of a directory tree is to help you and DOS find files when you need them. So once you've got your disk divided into goodness knows how many directories, how do you make sure DOS goes looking in the right one for the file you need?

You spell it out, that's how! You type the exact **path** that DOS has to follow to get from the root directory to the directory that contains your file, and then you type the file name at the end.

Imagine that you walked into the library with the desire to check out a book called *Scary Thoughts*, but had no idea where to find it. That's like DOS trying to find one file among the thousands of potential files on your hard disk. What if your librarian said, "Of course I know where it is. The book called *Scary Thoughts* is by Robert Wolcolm. It's in the Horror section, in the

stacks on the fifth floor." See how that equates to "Look for the file called MYREPORT.DOC. It's in the REPORTS directory, on drive C:"? That way, DOS knows exactly where to look.

How do you type a path?

To type a directory path, you have to use the **backslash** (\). Don't confuse it with the regular, or **forward**, **slash** (/) that's on the same key as the question mark.

This is important. You use a backslash to symbolize the root directory, and you use a backslash to separate subdirectory names and file names. This adds up to a lot of backslashing.

Here's what it looks like:

- \BUDGETS\1995 points DOS to a directory called 1995, which is a subdirectory of BUDGETS, which is just below the root directory.
- \BUDGETS\1996 points DOS to a directory called 1996, which is another subdirectory of BUDGETS, which is just below the root directory.
- \BUDGETS\1997\NOVEMBER.DOC points DOS to the document file NOVEMBER.DOC, which is stored in the directory 1997, which is a subdirectory of BUDGETS, which is just below the root directory.

In each of these three paths, the first backslash means, "Start at the root directory." Any other backslashes that follow are used to separate subdirectory names and file names from each other. If you don't type the exact path from the root through all the directories until you get to the directory or file that you need, DOS responds to you with the computer equivalent of "Huh?"

How to make directories

DOS has all sorts of commands you can use to work with directories. You'll use these commands a lot. For starters, you can make directories, change directories, and look to see what's inside directories. Let's do it.

At the DOS prompt, enter this command:

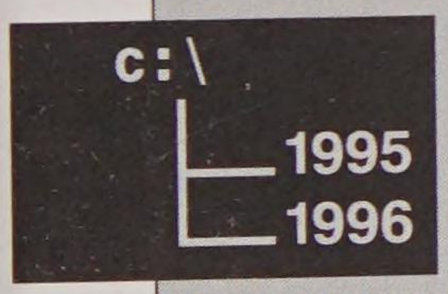
```
md \budgets
```

You just used the MD (short for *make directory*) command to make the directory BUDGETS. Now, you have to tell DOS you want to work inside the BUDGET directory:

```
cd \budgets
```

You just changed to the BUDGETS directory, using the CD (short for *change directory*) command. Look at your DOS prompt. It probably has the name of the new directory in it, like in figure 3.3.

Actually, you can have two files with the same name on the same disk



You saw before that DOS doesn't allow you to store two files with the same name in the same directory. As soon as you save the second one, the first one will be erased. If you stored the two files in different directories though, DOS wouldn't mind at all. That's because the paths to the files (or their addresses, if you like) are different.

Almost every city has more than one person named John Smith. They won't get mixed up too often because they all have different addresses. John Smith who lives on Maple Road will never receive mail for John Smith on 32nd Street.

If you have a file named NOVEMBER.DOC in the 1995 directory, you can also have a NOVEMBER.DOC in the 1996 directory. Because their paths, or addresses, are different, they must be separate files and are therefore allowed to exist on the same drive.

```
C:\>md \budgets

C:\>cd \budgets

C:\BUDGETS>
```

Fig. 3.3
You've just executed two directory commands—making a directory, and changing from one directory to another.

Now, make another directory:

md 1995

You made a subdirectory called 1995 inside the BUDGETS directory. Notice that you *don't use the backslash now*, because 1995 shouldn't branch off the root directory. It's a subdirectory of BUDGETS. Enter:

md 1996

You made another subdirectory. Again, this command does not use the backslash, because you want the subdirectory created right where you are now (in the BUDGETS directory). Now change back to the root directory. Enter:

**cd **

That's it! Look at your prompt. You're back where you started. No matter where you are in a directory tree, you can always get back to the root quickly with CD\.

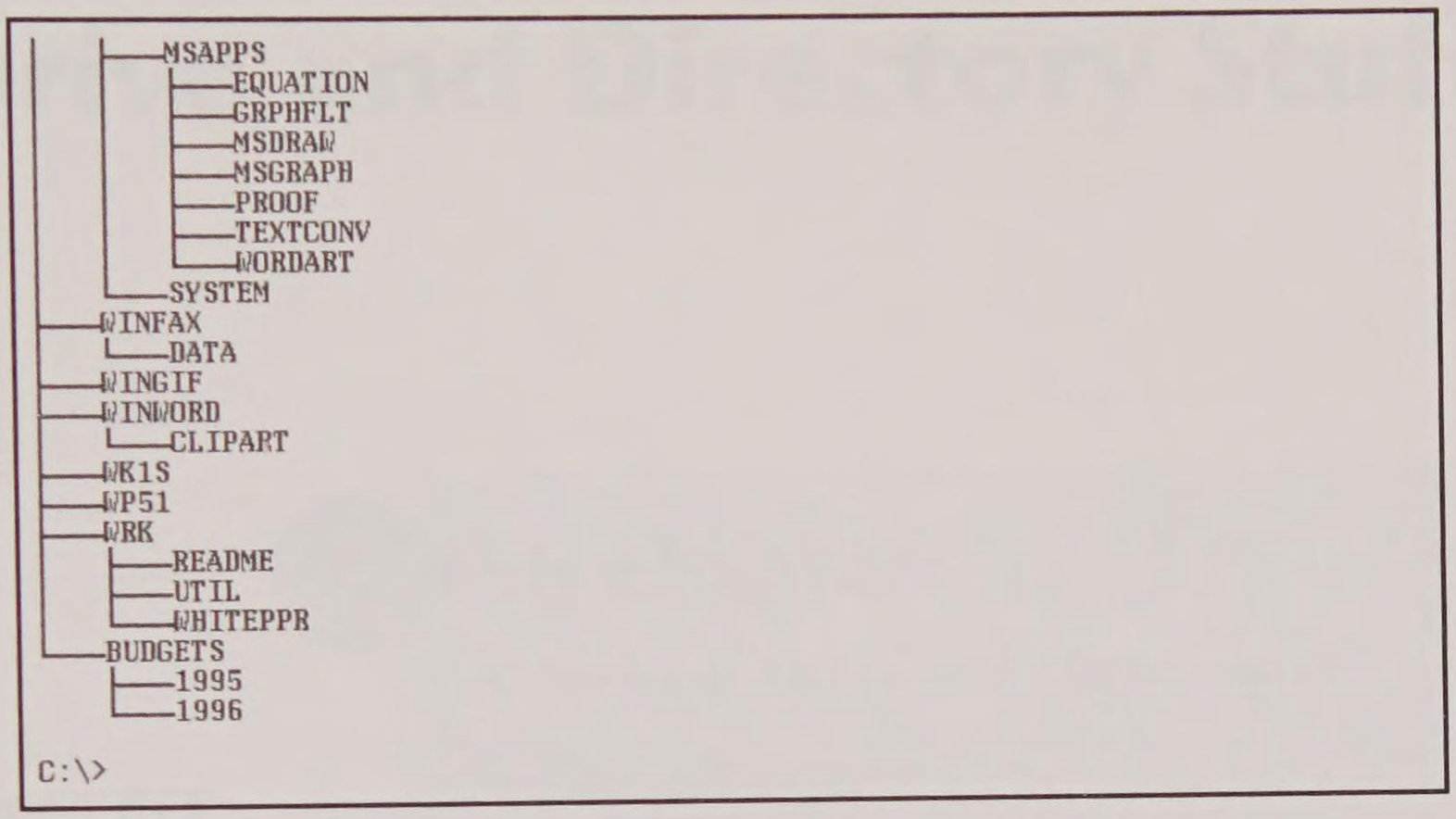
Take a look at your directory tree

You know you have directories on your disk now, but you can't see them anywhere. All you see is the DOS prompt. Want to see the whole directory tree on your screen? Use the TREE command, like this:

tree

When you press Enter, a chart representing the directories on your disk scroll by. It should look something like the one in figure 3.4.

Fig. 3.4
The new BUDGETS directory and its two subdirectories appear at the end of a very long list of directories on this hard disk.



Your prompt tells you where you are

C:\BUDGETS\1995

On most computers, the DOS prompt will automatically change to show you the name of the **current directory**, which is the directory DOS is currently working in, and the **current drive**, which is the drive DOS is currently working on.

When you first boot your PC, the prompt usually looks like `C:\>`. The C: shows that drive C: is current and the \ shows that the root directory is current. If you change to the BUDGETS directory, the prompt should look like this: `C:\BUDGETS>`. If you change to the 1995 directory that is inside BUDGETS, the prompt would become `C:\BUDGETS\1995>`.

If your DOS prompt doesn't show the current drive and directory, you have no way of knowing the drive or directory in which you're working. This is kind of like putting on a blindfold and stumbling around the filing cabinets in your office. Type this to fix it:

prompt pg

That's the DOS command PROMPT followed by one space and the PG. (Remember your syntax?) The "P" in the parameter stands for "Path." (You want the prompt to show you the path to where you are.) The "G" stands for the "greater than" sign. That's techno-talk for the little angle bracket that shows up at the end of every DOS prompt. Without the dollar signs, or if other characters are typed by accident, your prompt will come up really weird. Just issue the command again.

4 More Drive and Directory Stuff

In this chapter:

- So how do I know which files are where?
- Change the current drive...
- ...or directory
- Look at a different drive or directory
- Wild-card characters can save a lot of typing

DOS is much more precise and logical than most people, and you can't get it to bend the rules for a second. Just like the school librarian.

Okay, so if you have to follow the rules, you might as well understand them and use them to your advantage. One way to avoid the librarian most of the time is to understand how the book filing system works, so you don't have to keep asking for help. When you understand how your disk's directories and files work, you'll be amazed at how much more efficiently you can work with DOS and get things done (without getting your hands slapped).

What's on the disk? Use DIR to find out

Probably the most commonly used DOS command is DIR (short for *directory*), which just displays a list of files and directories on a disk or in a particular directory. In order to see all the files on drive C:, enter this command:

dir

The list of files on drive C: goes by on your screen. Was the list too long to see all on one screen? No problem. Add the /P switch, and it will pause at every screenful:

dir /p

Just press a key to see the next screen. Somewhere in there, you'll see your BUDGETS directory.

(That was your very first switch, wasn't it? And you didn't even blink.)

{Note}

The examples in this chapter continue from the examples in Chapter 3, "Get Started with the DOS Filing System." If you didn't try those commands, you still should be able to follow along from the figures. But you're welcome to go back and practice the commands in that chapter first before launching into these.

Now DIR another drive

The DIR command accepts parameters just like most other DOS commands. If you want to see the directory of another disk, add that drive's name as a parameter. Make sure there's a disk in drive A:, then type:

dir a:

The file names on drive A: will scroll by just as they do on the hard disk. If the directory listing is too long to fit in one screen, you can still use the /P switch at the end to pause it at every screenful, like this:

dir a: /p

Now DIR another directory

You've seen what's in the root directory on your hard drive. How about taking a look inside a different directory? Type:

dir \budgets

You should get a list of the two subdirectories that you made in the BUDGETS directory, like in figure 4.1.

What's all this stuff on the screen?

These are all directories within the current drive or directory you're looking at. Notice the <DIR> following each one. Each directory contains additional files not currently shown on your screen.

Here's the date and time that each file or directory was created or last modified.

```
QUE            <DIR>          07-22-94   3:03p
SCRDOS         <DIR>          11-08-94  11:39a
SYMBOLS        <DIR>          04-24-94  12:31a
TROUBLE        <DIR>          04-24-94  12:25a
UTIL           <DIR>          04-02-94  12:29a
WAVES          <DIR>          04-04-94   3:56p
WIN            <DIR>          03-31-94   6:21p
Press any key to continue . . .

(continuing C:\)
WINFAX         <DIR>          05-02-94  10:59p
WINGIF         <DIR>          04-04-94  11:25p
WINWORD        <DIR>          04-04-94   1:18p
WK1S           <DIR>          04-24-94   1:08a
WP51           <DIR>          04-02-94   1:10a
WRK            <DIR>          04-04-94   3:24p
AUTOEXEC BAT             206  10-23-94  12:51p
COMMAND  COM          54,619  09-30-93   6:20a
CONFIG   SYS             336  10-23-94  12:39p
METRO    EXE          51,904  02-29-88  12:00a
TESTFILE TXT              36  11-09-94   2:05p
        52 file(s)        107,101 bytes
                   15,728,640 bytes free

C:\>
```

Names not followed by <DIR> are just files.

Notice that in file names, DOS doesn't show the period as part of the file name. It separates the name and the extension into two columns instead.

The number next to each file name indicates the size of the file, measured in bytes.

The last lines of the directory listing show you how many entries are in the list, the total number of bytes used by the files, and how many bytes of space are still free on the disk. Notice that this listing says 52 files. Remember that DOS counts directories as files, too.

```
C:\>dir \budgets

 Volume in drive C is CONFUSING
 Volume Serial Number is 1DF2-097A
 Directory of C:\BUDGETS

.            <DIR>          12-28-94   4:24p
..           <DIR>          12-28-94   4:24p
1995         <DIR>          12-28-94   4:25p
1996         <DIR>          12-28-94   4:25p
        4 file(s)                  0 bytes
                          18,481,152 bytes free

C:\>
```

Fig. 4.1
Although you only created 2 directories inside BUDGETS, DOS shows you four! The extra directories have dots for their names and are created automatically by DOS every time a directory is created. DOS needs them to help navigate around the directory tree structure.

Change the default drive

DOS works with files on the current drive unless you tell it otherwise. Suppose you wanted to give several commands in a row, and they were to all affect drive A:. It might be a pain to always have to type the drive letter after the command. This is easily fixed because, in DOS, you can change the **default drive** (remember, it's also called the **current drive**).

> ***Plain English, please!***
>
> **Default** means something the computer will do automatically, unless you tell it otherwise. For example, the computer automatically reads the current drive (shown in the DOS prompt) when you do a DIR command. You make it read another drive by adding a parameter to the command or by changing the default drive.

In Chapter 3, "Get Started with the DOS Filing System," you learned to change drives. Try it again, now. Make sure your computer is on, and that there's a floppy in drive A:, and type:

```
a:
```

Now try typing just DIR alone, without any parameters:

```
dir
```

DOS shows you all the files in drive A:, right? By typing the drive letter alone, you have changed your default drive for all commands.

Now, unless you tell it otherwise, all commands will affect the floppy drive. So tell it otherwise. Let's stay on A:, but *look* at C:

```
dir c:
```

The directory of C: should scroll by, but the prompt stays at `A:\>`. When you've had enough touring, make the hard disk your default drive again:

```
c:
```

Q&A

My screen says `Not ready reading drive A, Abort, Retry, Fail?`

You can only change the default drive to a drive with a disk in it. If you don't have a hard disk, you can't work on C:. If you don't have a floppy in A:, you can't work on A:. Put a floppy in A: and type **r** for retry. If you can't find a floppy, type **f** for fail. When the message `Current drive is no longer valid` appears, type **c:** and press Enter.

{Note}

When you make a different drive current, that's called **switching drives**, or **changing drives**. So you might see an instruction like "Change to drive C: and do *blah blah,*" or "Switch to drive A: and do *yadda yadda*." That just means to type the drive letter and colon at the prompt, and press Enter.

Change the default directory

By default, DOS works with files in the current directory. Suppose you want to do a bunch of stuff with files in a subdirectory somewhere down the directory tree? You'd have to type the full path to each file every time you entered a command. Your fingers would be cramping up in no time! Or, you can change the current directory (also called the **default directory**, of course).

Still working on drive C: from the last example? Just type:

cd \BUDGETS

Now, try typing DIR without any parameters:

dir

DOS shows you the files and directories in the BUDGETS directory (see fig. 4.2). Every command you type now will affect the BUDGETS directory.

```
C:\>cd \budgets

C:\BUDGETS>dir

 Volume in drive C is CONFUSING
 Volume Serial Number is 1DF2-097A
 Directory of C:\BUDGETS

.            <DIR>          12-28-94   4:24p
..           <DIR>          12-28-94   4:24p
1995         <DIR>          12-28-94   4:25p
1996         <DIR>          12-28-94   4:25p
        4 file(s)                  0 bytes
                          18,481,152 bytes free

C:\BUDGETS>
```

Fig. 4.2
By changing the default directory to \BUDGETS, all DOS commands will automatically affect files in that directory.

{Note}

You may have noticed that the pictures of the DIR commands in this chapter show that `Volume in drive C is CONFUSING`. This is called a **volume label** and lets you name any disk anything you like. Volume labels are discussed in Chapter 6, "DOS Stuff You Can Do with Disks."

You can make one of the BUDGETS subdirectories current, too. Type:

cd 1995

Look at your prompt! The \BUDGETS\1995 directory is now current (see fig. 4.3).

Fig. 4.3
Now you're working in C:\BUDGETS\1995.

```
C:\>cd \budgets

C:\BUDGETS>dir

 Volume in drive C is CONFUSING
 Volume Serial Number is 1DF2-097A
 Directory of C:\BUDGETS

.            <DIR>          12-28-94   4:24p
..           <DIR>          12-28-94   4:24p
1995         <DIR>          12-28-94   4:25p
1996         <DIR>          12-28-94   4:25p
        4 file(s)              0 bytes
                       18,481,152 bytes free

C:\BUDGETS>cd 1995

C:\BUDGETS\1995>
```

To get back to the root directory, just type:

**cd **

From any directory anywhere on the disk, this command is all it takes to get back to the root.

{Note} When you use the CD command to make a different directory current, that's called **changing the directory**.

View a partial file list with wild cards

Imagine that you are about to present some sales figures to your company's board of directors. You need copies of all the files for the McGovern account, you don't care what year. You also need all of the files for 1994 sales, you don't care what account. You've got your assistant working late trying to track down and copy those particular files.

How would you do it with DOS? You could use DIR over and over in different directories until you find the files. Then you could use COPY (the command for copying files) over and over until each file was copied. It would be really boring and very time-consuming. Or, you could use **wild cards**! DOS has two wild-card characters that you can use to get your commands to work on a group of files, instead of on one file at a time.

Plain English, please!

Wild-card characters work pretty much like wild cards in poker, Crazy Eights, and other card games. A card, or in this case a character, is designated as being "wild." That means it can stand for any other card or character. The wild-card characters in DOS are the asterisk (*) and the question mark (?).

The question mark replaces just one character at a time

The question mark (?) can replace any one character in a file name. To see how it works, start by changing to a directory with lots of files in it. On drive C:, type:

```
cd \dos
```

Then try this command:

```
dir mo?e.com
```

DIR is the command, followed by one space. Everything else is *one word*, entered without spaces. DOS should show you all the files in the \DOS directory that start with MO and end in E, and have a COM extension. I got the two file names shown in figure 4.4, MORE.COM and MODE.COM.

Let's try another one:

```
dir ?2??.cpi
```

DOS should pick out files that have four-letter names with a 2 as the second character, and the extension CPI. Did you get the same ones as I did (see fig. 4.5)?

Fig. 4.4
This command really means, "Show me all the file names where the first two letters are MO, I don't care what the third letter is, the fourth is an E, and the extension must be COM."

```
C:\DOS>dir mo?e.com

 Volume in drive C is CONFUSING
 Volume Serial Number is 1DF2-097A
 Directory of C:\DOS

MODE     COM         23,569 09-30-93   6:20a
MORE     COM          2,545 09-30-93   6:20a
        2 file(s)         26,114 bytes
                      15,695,872 bytes free

C:\DOS>
```

Fig. 4.5
There may be more "CPI" files with a 2 as the second character, but these are the only ones with four characters in their names.

```
C:\DOS>dir mo?e.com

 Volume in drive C is CONFUSING
 Volume Serial Number is 1DF2-097A
 Directory of C:\DOS

MODE     COM         23,569 09-30-93   6:20a
MORE     COM          2,545 09-30-93   6:20a
        2 file(s)         26,114 bytes
                      15,695,872 bytes free

C:\DOS>dir ?2??.cpi

 Volume in drive C is CONFUSING
 Volume Serial Number is 1DF2-097A
 Directory of C:\DOS

4201     CPI          6,404 02-18-93   5:00p
4208     CPI            720 02-18-93   5:00p
5202     CPI            395 02-18-93   5:00p
        3 file(s)          7,519 bytes
                      15,695,872 bytes free

C:\DOS>
```

(Tip)

Not everyone has the same files in their DOS directory, so don't worry if you get a different directory list. Actually, not everyone has a DOS directory. If you don't, just pick any directory on your disk, and try some wild cards.

(Tip)

Wild cards aren't just for the DIR command; they also work with commands that delete, copy, move, and rename files, as you'll see in the next chapter.

The asterisk can stand for a bunch of characters

DOS has another wild card—potentially even more powerful than the question mark. When you want to work with a larger group of files, you can use the asterisk (*) in your commands. The asterisk is used to replace *several* characters at once. For example, if you wanted to see *all* the CPI files in your DOS directory, you could type:

dir *.cpi

The asterisk represents every possible character in the file name. So, DOS finds all files with a CPI extension. My list is shown in figure 4.6.

Fig. 4.6
The asterisk stands for any character, and the characters that follow it. Because the CPI extension was still typed, DOS shows all files with a CPI extension.

```
 Volume Serial Number is 1DF2-097A
 Directory of C:\DOS

4201     CPI         6,404 02-18-93   5:00p
4208     CPI           720 02-18-93   5:00p
5202     CPI           395 02-18-93   5:00p
        3 file(s)          7,519 bytes
                      15,695,872 bytes free

C:\DOS>dir *.cpi

 Volume in drive C is CONFUSING
 Volume Serial Number is 1DF2-097A
 Directory of C:\DOS

4201     CPI         6,404 02-18-93   5:00p
4208     CPI           720 02-18-93   5:00p
5202     CPI           395 02-18-93   5:00p
EGA      CPI        58,870 09-30-93   6:20a
EGA2     CPI        58,870 09-30-93   6:20a
LCD      CPI        10,753 02-18-93   5:00p
        6 file(s)        136,012 bytes
                      15,679,488 bytes free

C:\DOS>
```

To see all files that start with the letter M, no matter what their extensions (if any) are, type:

dir m*.*

The file specification here says "Gimme an M!—and I don't care what else." My listing had 48 files in it—more than I could fit on the screen (see fig. 4.7). The asterisk will accept anything, including no characters at all. If I had a file named just M (with no extension), the last command would have found that one, too.

```
MSHERC   COM         6,934 02-18-93   5:00p
MSTOOLS  DLL        13,424 03-10-93   6:00a
MWAV     EXE       142,640 03-10-93   6:00a
MWAV     INI           354 04-05-94   2:46a
MWAV     HLP        24,619 03-10-93   6:00a
MWAVABSI DLL        54,576 03-10-93   6:00a
MWAVDLG  DLL        36,368 03-10-93   6:00a
MWAVDOSL DLL        44,736 03-10-93   6:00a
MWAVDRVL DLL         7,744 03-10-93   6:00a
MWAVMGR  DLL        21,712 03-10-93   6:00a
MWAVSCAN DLL       151,568 03-10-93   6:00a
MWAVSOS  DLL         7,888 03-10-93   6:00a
MWAVTSR  EXE        17,328 03-10-93   6:00a
MWBACKF  DLL        14,560 03-10-93   6:00a
MWBACKR  DLL       111,120 03-10-93   6:00a
MWBACKUP HLP       400,880 03-10-93   6:00a
MWBACKUP EXE       309,696 03-10-93   6:00a
MWGRAFIC DLL        36,944 03-10-93   6:00a
MWUNDEL  EXE       130,640 09-30-93   6:20a
MWUNDEL  HLP        35,741 03-10-93   6:00a
MSD      INI           620 05-31-94   6:22a
       48 file(s)    2,909,890 bytes
                    15,663,104 bytes free

C:\DOS>
```

Fig. 4.7
The asterisk can be preceded by regular characters (such as the M) if you want to tighten up the search a little more.

Plain English, please!

Many experienced users call the asterisk a **star**. When using wild cards with *all* files in a directory or on a drive, you type *.*, which is generally pronounced "star dot star."

(Tip)

A really neat way to use the * wild card is like this: *.*, which means all files and all extensions. It's a quick way to get DOS to copy, move, or delete all the files on a disk or in a directory.

To get a better idea of how the asterisk wild card works, try the following directory commands in C:\DOS. Look at each one before you try it, and try to guess what files it will show. Then enter the command to see if you were right.

- dir *.com
- dir *.exe /p
- dir *.*
- dir dis*.*
- dir dis*.com

5 How to Examine the Files on Your Disk

Staring at lists of files is not my idea of a good time. Give yourself a break. Here are some fun things you can do with DOS.

In this chapter:

- And you thought you couldn't make files with DOS
- You can look inside files with DOS, too
- Files and more files
- How to print a list of files

The more you use the DIR command, the more times you'll see what seems like (and may be) thousands of files flying by on the screen. This can be pretty depressing if you don't know what all those files are, where they came from, or what they're for. Or if you can't find the files you want in the midst of the whole mishmash. This chapter shows you some neat ways to figure out what you've got on that disk and take control of the whole file situation.

Making files with DOS

You can use DOS to make files. If you were paying attention in Chapter 2, "Time to Jump in with Both Feet," you might have thought I said you couldn't; but what I really said was you *usually* use another software program to make files.

Way back before there were zillions of software programs for entering and editing words in your computer, DOS had COPY CON, a command you use to make a text file. COPY CON doesn't have all the bells and whistles of text editors you'll find in DOS 5.0 or later, but if you're in a hurry and don't need anything fancy, it'll do.

Try this set of steps to create a sample file. Use figure 5.1 as a guide:

1. Enter **cd ** to switch to the root directory.
2. Enter **copy con testfile.txt**. This is the command telling DOS you want to create a file called TESTFILE.TXT. DOS moves the cursor down one line and waits for you to type the file text.
3. Type this: **This is actually working, I think!**
4. Press Enter. DOS moves the cursor down another line.
5. Press F6. DOS puts an **end-of-file marker** on the blank line; it looks like this: `^Z`.
6. Press Enter. DOS sends you this message: `1 file(s) copied`. You made a text file!

Date and time not right?

When you do a directory list, you might notice that the date or the time next to TESTFILE.TXT don't reflect the real time that you made the file. This means that your PC's internal clock isn't set correctly—but that's really easy to fix with DOS.

Depending on which of the two isn't correct—date or time—use the following commands at the DOS prompt. If both are wrong, use these commands one at a time:

date

time

Then follow the instructions on-screen. Remember to use slashes (/) between the parts of the date and the colon (:) between the numerals in the time.

{Note}

No, you didn't actually *copy* anything, despite the message. DOS just copied the stuff you typed (`This is actually working, I think!`) into the file name you specified (TESTFILE.TXT) to create a new file.

```
C:\>copy con testfile.txt
This is actually working, I think!
^Z
        1 file(s) copied

C:\>
```

Fig. 5.1
The COPY CON command is used here to create a file named TESTFILE.TXT.

(Tip)

Use the DIR command to look for your file in the current directory—I promise it's there!

Looking inside files with DOS

Okay, now you've created your sample file, TESTFILE.TXT. To see what's in the file, you use the TYPE command to "type" the contents of the file on the screen.

To see the file you just created, use this command:

type testfile.txt

Your screen should look like figure 5.2.

```
C:\>copy con testfile.txt
This is actually working, I think!
^Z
        1 file(s) copied

C:\>type testfile.txt
This is actually working, I think!

C:\>
```

Fig. 5.2
The TYPE command displays the contents of the file, starting wherever the DOS prompt was on the screen.

If you see happy faces, it's not a text file

With COPY CON you can only create **text files**—plain files that contain only letters or numbers. A file's extension frequently indicates the type of file you're dealing with. (The extension TXT is supposed to help identify the file as text.)

DOS can only read plain text files, like the one in this example. Text files don't contain special codes to make characters boldface or italic, they just contain plain old letters or numbers. DOS can't read files that contain special codes, like program files that are written in computer code. When you use the TYPE command to display a program file, you see happy faces and other strange characters on your screen.

To see what I mean, try using TYPE to read a program file, like this:

```
type command.com
```

If DOS didn't find COMMAND.COM in the root directory, type **cd \dos** to change to the DOS directory and try the command from there.

What are all these files for, anyway?

By now, you might have mustered up the nerve to examine a few of the subdirectories already on your hard disk. They might have names like \WINDOWS, or \WP51, or \WINWORD. You might even have some idea about what's supposed to be inside them (Microsoft Windows, WordPerfect, or Word).

The scary thing is how a simple DIR command within any of these program directories starts a huge list of files scrolling by. Their names seldom make any sense and you will often wonder if it's okay to erase a few files to free up some disk space. (We cover erasing files in Chapter 8, "Deleting All Those Darn Copies.")

(Tip)

Never erase files if you don't know what they do. When programs are installed in your PC's hard disk, they usually bring along scads of support files that help them do their work. If you know that a directory contains a certain program, it's best to leave all the files in there alone and to limit your file management commands to the directories and files where your *data* is stored.

Listing the files in a wide format

Whenever you come across a really long list of file names (like in your \DOS directory), you might find that you want to display all the files on the screen at one time. You can't do this with DIR /P, but DOS does have one other really cool switch for the DIR command. Type:

dir \dos /w

Your files will all be displayed in a *wide* format, across the screen as in figure 5.3.

Fig. 5.3
Using the /W switch makes DOS display your file names in five columns across the screen. The file sizes and dates are hidden to make room for all the information.

```
MEMMAKER.INF    MEMMAKER.EXE    MEMMAKER.STS    MEMMAKER.HLP    MIRROR.COM
MODE.COM        MONEY.BAS       MONOUMB.386     MORE.COM        MOVE.EXE
MSAVIRUS.LST    MSBACKDB.OVL    MSBACKDR.OVL    MSBACKFB.OVL    MSBACKFR.OVL
MSBACKUP.INI    MSBACKUP.RST    MSBACKUP.EXE    MSBACKUP.OVL    MSBACKUP.LOG
MSBACKUP.HLP    MSBCONFG.HLP    MSBCONFG.OVL    MSCDEX.EXE      MSD.EXE
MSD.COM         MSHERC.COM      MSTOOLS.DLL     MWAV.EXE        MWAV.INI
MWAV.HLP        MWAVABSI.DLL    MWAVDLG.DLL     MWAVDOSL.DLL    MWAVDRVL.DLL
MWAVMGR.DLL     MWAVSCAN.DLL    MWAVSOS.DLL     MWAVTSR.EXE     MWBACKF.DLL
MWBACKR.DLL     MWBACKUP.HLP    MWBACKUP.EXE    MWGRAFIC.DLL    MWUNDEL.EXE
MWUNDEL.HLP     NETWORKS.TXT    NIBBLES.BAS     NLSFUNC.EXE     NOW.EXE
OS2.TXT         PACKING.LST     POWER.EXE       POWER50.EXE     PRINT.EXE
PRINTER.SYS     PWSETUP.EXE     QBASIC.HLP      QBASIC.EXE      RAMDRIVE.SYS
README.1ST      README.TXT      RECOVER.EXE     REMLINE.BAS     REPLACE.EXE
RESTORE.EXE     SCANDISK.EXE    SCANDISK.INI    SETVER.EXE      SHARE.EXE
SIZER.EXE       SMARTDRV.SYS    SMARTDRV.EXE    SMARTMON.EXE    SMARTMON.HLP
SORT.EXE        SUBST.EXE       SYS.COM         TDIAGS.EXE      TREE.COM
TSETUP.EXE      ULTRA.COM       UNDELETE.EXE    UNFORMAT.COM    VFINTD.386
VRESUME.SYS     VRESUME.COM     VRESUME.TXT     VSAFE.COM       XCOPY.EXE
MSD.INI         CC41116A.FUL    DEFAULT.CAT     CC41116B.FUL    CC41116C.FUL
CC41116D.FUL    CC41116E.FUL    MSAV.EXE        MSAV.HLP        MSAVHELP.OVL
MSAVIRUS.LSL    MSAV.INI        HELP.OLD        EDIT.OLD        EDIT.HLP
      195 file(s)      7,471,950 bytes
                      18,481,152 bytes free

C:\>
```

In figure 5.3, you'll notice that the DOS directory has so many files that it couldn't get them all onto one screen, even using the /W switch (that's rare, by the way). In this case, DOS will allow you to combine more than one switch at a time in the command. Type:

dir \dos /w/p

That's like saying, "Show me the file names in the DOS directory, display them wide across the screen, and pause them at every screenful." Figure 5.4 shows the effect of using the two command switches together.

Fig. 5.4
By combining the /W and /P switches, you can get the maximum number of file names on your screen and still have time to read them all.

```
 Volume in drive C is CONFUSING
 Volume Serial Number is 1DF2-097A
 Directory of C:\DOS

[.]             [..]            4201.CPI        4208.CPI        5202.CPI
ANSI.SYS        APM.SYS         APPEND.EXE      APPNOTES.TXT    ASSIGN.COM
ATTRIB.EXE      AUTOEXEC.UMB    BIOSVER.EXE     CC40404B.FUL    CF40402A.FUL
CF40404A.FUL    CHKDSK.EXE      CHKLIST.MS      CHKSTATE.SYS    CHOICE.COM
COMMAND.COM     COMP.EXE        CONFIG.UMB      COUNTRY.SYS     DBLSPACE.HLP
DBLSPACE.BIN    DBLSPACE.EXE    DBLSPACE.SYS    DBLSPACE.INF    DBLWIN.HLP
DEBUG.EXE       DEFAULT.SLT     DEFAULT.SET     DEFRAG.HLP      DEFRAG.EXE
DELOLDOS.EXE    DELTREE.EXE     DF40401A.FUL    DISKCOMP.COM    DISKCOPY.COM
DISPLAY.SYS     DOSHELP.HLP     DOSKEY.COM      DOSSHELL.EXE    DOSSHELL.HLP
DOSSHELL.INI    DOSSHELL.COM    DOSSHELL.GRB    DOSSHELL.VID    DOSSWAP.EXE
DRIVER.SYS      EDIT.COM        EDLIN.EXE       EGA.SYS         EGA.CPI
EGA2.CPI        EMM.SYS         EMM386.EXE      EMM38650.EXE    EXE2BIN.EXE
EXPAND.EXE      FASTHELP.EXE    FASTOPEN.EXE    FC.EXE          FDISK.EXE
FDISK50.EXE     FF40404B.FUL    FF40404C.FUL    FIND.EXE        FORMAT.COM
FORMAT50.COM    GORILLA.BAS     GRAFTABL.COM    GRAPHICS.PRO    GRAPHICS.COM
HELP.HLP        HELP.COM        HIMEM.SYS       INTERLNK.EXE    INTERSVR.EXE
JOIN.EXE        KEYB.COM        KEYB50.COM      KEYBOARD.SYS    KEYBRD2.SYS
KEYBRD50.SYS    LABEL.EXE       LCD.CPI         LOADFIX.COM     MEM.EXE
MEMMAKER.INF    MEMMAKER.EXE    MEMMAKER.STS    MEMMAKER.HLP    MIRROR.COM
Press any key to continue . . .
```

The EXE and COM files run programs

You already know that the extension used in a file name will often give you a clue about the file's *type*. TXT files, for example, are usually text files that will work with the TYPE command. Files that end in EXE or COM are program files that are often referred to as being **executable**.

Look at figure 5.4 to see some examples within the DOS directory. Any file ending with one of these extensions is a program, and you can run it by typing its first name. CHKDSK.EXE and HELP.COM appear in the figure and can be loaded by typing CHKDSK or HELP.

<Caution> Using a DOS command that you don't understand can be hazardous to your PC's health. (It's like taking medicine if you're not really sick.)

There are lots of other file extensions that, at first glance, don't seem to do anything important. These files probably keep your system running though, so here's a list of the most common ones.

Extension	File Type
EXE	Executable program file. Run it by typing its **first name**.
COM	Another type of program file, similar to EXE.
BAT	A batch file that is also executable by typing its first name.
SYS	A program file that is *not* executable by the user, probably read by your computer during the boot.
BAS	A program written in BASIC or QBASIC, both programming languages.
INI	An initialization file, used by programs to get information about your system.
HLP	A file used by the DOS or Windows HELP command.
DLL, OVL	Examples of important program files that are loaded by other programs.

How to print a directory listing

If you ever want to print out a list of what's on a disk, you can use DOS. This comes in handy for a directory listing that is too long for the screen, for reminding yourself of what files are put on a disk, or for letting a co-worker know what's on a disk you give her. Insert the diskette into drive A:, make sure your printer is turned on, and then type:

dir a: >prn

This command tells DOS to do a directory of drive A:, but instead of showing it on the screen, redirect it to the printer!

Here's the breakdown: the regular "DIRectory of A:" command, followed by the redirection symbol, >, and the name of the printer, PRN. What you normally see on your screen comes spewing out of the printer.

{Note}

Redirection may not work if your computer prints through a network to a shared printer. Talk to your network supervisor. She may suggest another printer name, like LPT1.

(Tip)

The >PRN parameter works with any command that you can type at the DOS prompt. If you wanted to, you could enter **type testfile.txt >prn** and you'd have a printout of the file you created earlier in the chapter. Hint: That file was placed in the root directory. If you're still in C:\DOS, you'll have to return to the root to work with that file (**cd **).

6 DOS Stuff You Can Do with Disks

In this chapter:

- This disk is bigger. Does it hold more?
- What you have to do before you can use a floppy disk
- How to make an emergency boot disk (do this; it's important!)
- I like this disk; can I copy it?
- Okay, it's perfect. How do I make sure I don't erase it accidentally?

Don't take your disks for granted! Get used to handling them and to telling DOS how to handle them. You rely on your disks to safeguard your precious data.

If DOS manages your disks and disk drives, why, you may be wondering, do you need to bother knowing anything about them? Well, you have to do your part, too. Usually, your hard drive is all set, safe inside your computer. It's ready for action from the minute you unpack the box, and you don't have to give it much thought. Floppies, on the other hand, are high-maintenance little devils. You really have to put a little effort into taking care of them. Because sometimes all that stands between your data and disaster is that small rectangle of plastic, it's worth your while to find out what makes them tick.

{Note} You'll see all these terms used pretty much interchangeably in this book and throughout the computer world: floppy, floppy disk, diskette. They're all basically the same thing.

Disks come in different sizes

First thing, you have to figure out what kind of floppy disks you can use with your computer. It depends on what kind of floppy disk drives you have. Disks and drives break down two ways—in size and density. Find out what size and density your drives are, then use the disks that match! (Disk size is determined by physical measurement of the disk's diameter.)

Plain English, please!

Disk **density** is a fancy way of referring to how tightly data can be packed onto the disk. A disk with a higher density can store more data than a disk with a lower density, even if they are both the same size. While we're on the subject, the amount of data that a disk can hold is called the disk **capacity**. Disk capacity is measured in bytes.

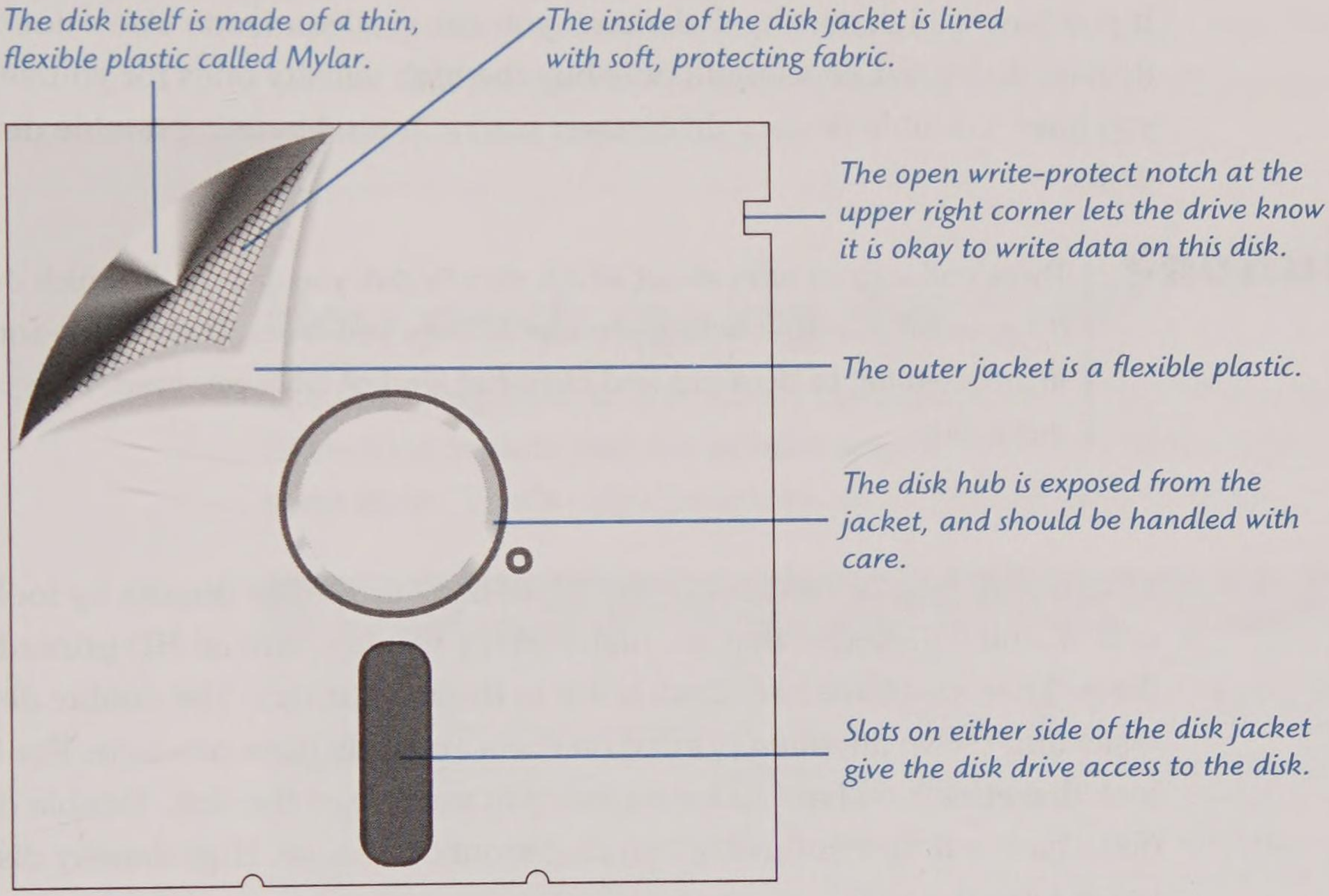
What density drive do I have?

Both 3.5-inch and 5.25-inch disks and drives come in two kind of densities: **double density** and **high density**. To find out what kind of drive you have, look at the packing slip that came with your PC, or ask your local guru. Really. You can't tell by looking at the drive.

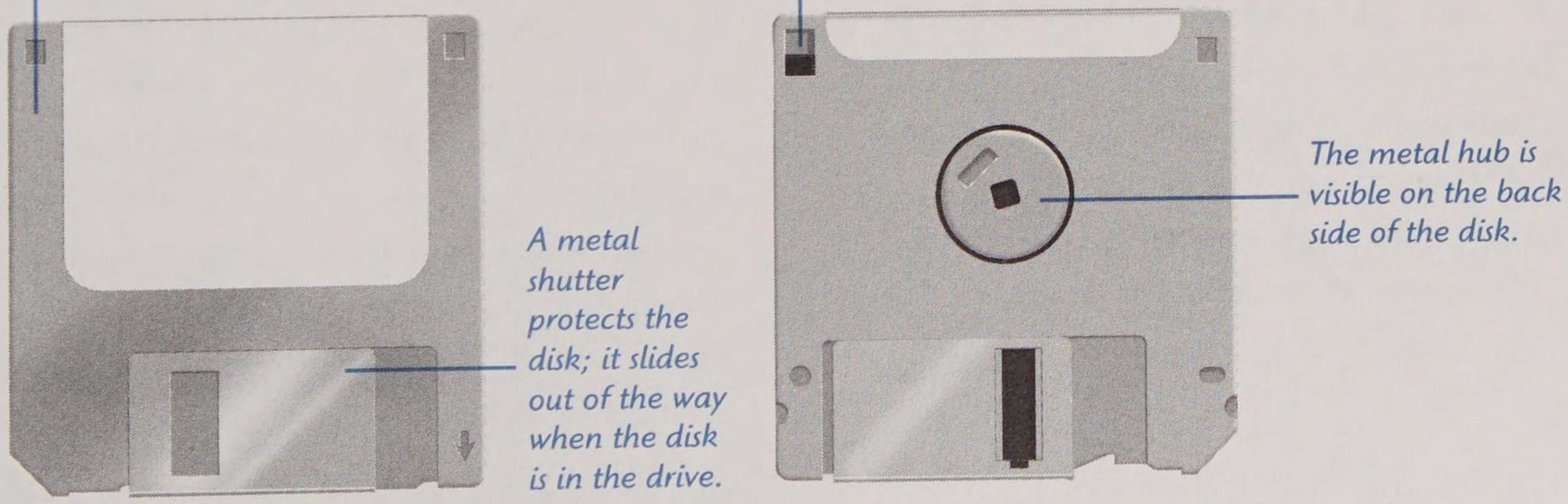
Here are some clues that might help you figure it out:

- If your PC is less than two years old, chances are your drives are high density.
- If your PC uses an 80386 processor chip or higher, chances are your drives are high density.
- Even if your PC uses an 80286 chip, there's a good chance your drives are high density.

What size drive do I have?



This is a 5.25-inch disk.



These are 3.5-inch disks.

- If you have two disk drives the same size, chances are that one is high density and the other is double density.
- Most drives in use today are high density.

If you have a high density disk drive, you can read someone else's double density disks, but you should only buy the high density ones for yourself. If you have a double density drive, then you're limited to using double density disks.

There's all sorts of rules about which density disk you can use in which density drive, but if you do it wrong you can damage your data. The easiest—and smartest—thing to do is just find out what kind of drive you have, then use those disks.

You can tell whether a diskette is high density or double density by looking at it. 3.5-inch diskettes that are high density usually have an HD printed on them. They also have two small holes in the top corners. The double density disks don't have anything printed on them and only have one hole. For 5.25-inch diskettes, you have to look closely at the hub of the disk. Double density disks have a little reinforcing hub ring around the hole. High density disks never have the ring.

What do you mean by density?

The density of a disk refers to its capacity for holding information. A high density diskette holds about twice as much data as a double density diskette, and a double density holds about twice as much as a single density disk. (Thankfully, single density disks and drives disappeared years ago.)

Each type of diskette requires a special type of disk drive to use it. High density drives have smaller **read/write heads** to allow them to record the bytes of data closer together. Because diskettes store information magnetically, high density disks have a special coating that keeps the tightly packed bytes from attracting and repelling each other. Otherwise the information would move around and erase itself!

(Tip)

If you have at least DOS version 6 or Windows, you can use the DOS MSD command to find out what kind of drives you have. Do this: At the DOS prompt, type **msd** (and press Enter). When the MSD screen appears, press **d** (which stands for *disk drives*). Read the information MSD displays, paying close attention to the number next to drive A: and B: (if you have one). Compare them with the disk density table in the next section. When you're done, press Enter, and then press F3.

How much can my disk hold?

The following table tells you how much data each type of disk can hold. It's interesting to note that the smaller-sized disks can hold more than the larger-sized disks. That's called *progress*, or technological innovation.

Diskette Size	Density	Capacity
5.25-inch	Double density	360 kilobytes
5.25-inch	High density	1.2 megabytes
3.5-inch	Double density	720 kilobytes
3.5-inch	High density	1.44 megabytes

What's a byte, anyway?

A **byte** is simply computer-talk for *one* character, and the word *byte* is four bytes long. Get it? Letters, numbers, blank spaces, and symbols are all represented by bytes in computer language. They are used to measure the size of data in a computer. If a diskette has 1024 bytes of free space on it and you have a file containing 500 bytes, then you know it will fit with room to spare.

Because disks have grown in capacity over the years even while shrinking in physical size, we tend to measure things now in **kilobytes** and **megabytes**. A kilobyte is roughly 1,000 bytes and a megabyte is roughly a million.

Getting a floppy disk ready to use

Most of the time, when you buy a brand new box of floppy diskettes, they are not exactly "ready-to-go." They must be **formatted** first.

An unformatted disk is a like a blank piece of paper. You don't know where to write because there are no lines. When DOS formats a disk, it draws the lines, so it knows where to write your files, and where to find them later (see fig. 6.1).

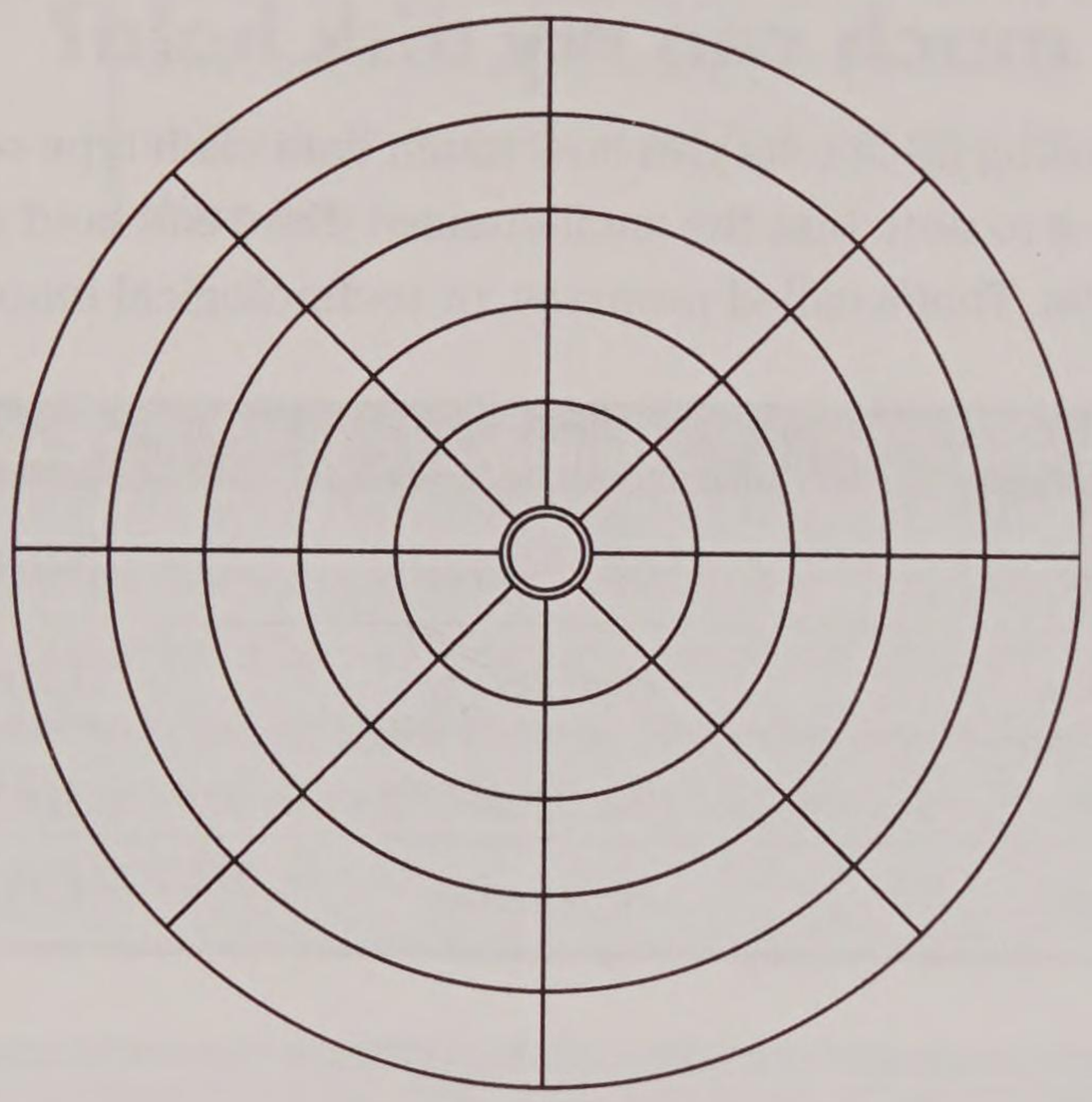


Fig. 6.1
When a disk is formatted, magnetic lines and circles are recorded onto the disk. This gridwork forms the spaces where files are stored.

(Tip)

Actually, you can buy disks that have already been formatted. They're called **preformatted disks**, and they're the greatest invention since sliced bread, although they cost a little more. If you buy preformatted disks, just be sure you read the box—the ones that are preformatted for Apple computers won't work on your PC, and vice versa. Get the ones labeled "Preformatted for IBM."

<Caution>

Formatting a disk erases any information already stored on the disk. Never format a disk unless you know it is brand new, or you deliberately want to erase everything off of it.

The FORMAT command works on hard disks as well as floppies. Please, please, please, never format your C: drive by accident!

How do I format a floppy disk?

You format a disk with the DOS FORMAT command. Make sure your computer is on, then follow these steps:

1 At the C:\> prompt, type **format a:** and press Enter (see fig. 6.2).

Fig. 6.2
Basically you can just follow the instructions on-screen from this point.

```
C:\>format a:
Insert new diskette for drive A:
and press ENTER when ready...
```

{Note} Depending on your version of DOS, your prompts may differ from those shown here.

2 Gently slide a *blank* diskette into drive A:, and then press Enter.

3 DOS keeps you informed on how the formatting is going, then finally asks you to type a volume label. Press Enter to ignore this for now.

4 DOS shows you a report about the capacity of the disk, then asks if you want to format another. Type **n** and press Enter to say "No"(see fig. 6.3).

Fig. 6.3
To format more diskettes, answer **y**. DOS prompts you to insert a diskette, as in the previous step 1. You can do an entire box of disks this way, without retyping the command each time.

```
C:\>format a:
Insert new diskette for drive A:
and press ENTER when ready...

Checking existing disk format.
Saving UNFORMAT information.
Verifying 1.44M
Format complete.

Volume label (11 characters, ENTER for none)?

    1,457,664 bytes total disk space
    1,457,664 bytes available on disk

          512 bytes in each allocation unit.
        2,847 allocation units available on disk.

Volume Serial Number is 2A19-12F5

Format another (Y/N)?n
```

(Tip)

To format a disk in drive B:, just substitute B: for A: in these steps.

Q&A

If I format this double density disk in my high density drive, does it become a high density disk?

No. Really, you shouldn't mess around mixing densities, but—in an emergency—you can format a double density disk in a high density drive. You just have to add a switch to tell DOS that it's formatting a double density disk. This will make a double density disk that you can use in your system, although it may not work reliably in someone else's double density drive.

To format a 3.5-inch double density disk in a high density drive, type:

format a:/f:720

To format a 5.25-inch double density disk in a high density drive, type:

format a:/f:360

You can never use or format a high density diskette in a double density drive.

What's this volume label stuff?

At the end of the format operation, DOS asks you to type in a **volume label**. This is basically just a name for your disk that appears at the top of the screen every time you DIR your disk. You can type up to eleven letters for a volume name. Or, you can type nothing at all. To see what label a disk already has, use the VOL command, like this:

vol a: (or **b:**, or even **c:**)

To change a label, use the LABEL command, like this:

label a: (or **b:**, or even **c:**)

Then do what DOS tells you. By the way, this is how my hard disk became "CONFUSING!"

Oops! I didn't mean to format THAT one!

Despite all the warnings, the day will come where you proudly complete a format, only to discover that the wrong disk was in the drive, or that you meant to format the *other* drive letter. When you do this (not *if* you do this), thank your lucky stars for the UNFORMAT command.

Immediately after formatting the disk, enter:

unformat a: (or whatever drive letter you messed up, even C:)

Read the warnings that appear on the screen and then type the letter **y**. This command will save your bacon, so remember it!

You can only use UNFORMAT if the following apply:

- You have DOS 5 or later.
- You haven't stored any new files on the disk.

Here are some reasons why DOS may *not* be able to unformat a disk:

- DOS couldn't save the unformat information, which it tries to do whenever you format a disk.
- You stored something on the disk after it was formatted. UNFORMAT only works if you have not stored any new information on the disk. So, you have to realize your mistake fast. As soon as you discover that you need the data on a disk you have formatted, you can try to unformat it.
- There was a fragmented file on the disk. If DOS finds a fragmented file on the disk, it won't be able to recover the complete file.
- You used the Unconditional switch with the format command, like this: FORMAT /U. DOS didn't save the unformat information.

What's an emergency boot disk? And how do I make one?

An **emergency boot disk** is a floppy disk that you can use to start DOS when your hard disk doesn't work. You keep jumper cables for your car. Why not have an emergency boot diskette for your computer?

> ***Plain English, please!***
>
> You might hear talk about a **system disk**, or a **boot disk**. Those are just other terms for what I'm calling an emergency disk.

What's MIRROR?

When DOS formats a disk today, it automatically saves the information necessary to unformat that disk and restore all the files. In the pre-DOS 6.0 days, this could be done by the user typing the DOS command MIRROR. The vital file allocation information was saved independently of the FORMAT command (without formatting the disk) and served as a handy backup against corrupted data, unexpected formats, and so on.

You could also use MIRROR to create a delete tracking file to use for undeleting individual files. In DOS 6.0, delete protection and automatic unformatting were added as features, so Microsoft discontinued the command.

If you have a version of DOS earlier than 6.0, you can still use MIRROR. Just type **mirror c:** (or **a:** or **b:**), and press Enter to create the file used for unformatting. Type **mirror c: /tc** to set up a delete tracking file to keep a list of all files deleted on the named drive, (in this case, drive C:). DOS 6.0 and later has moved this feature to the UNDELETE command.

With DOS 6.0 or higher, you don't have to use the MIRROR command. When you format a disk, DOS does just about the same thing automatically to save the unformat information.

To make an emergency boot diskette, use the FORMAT command with the /S switch. Get a blank diskette that fits in your drive A: Not drive B:. It has to fit in drive A:. Then type:

format a: /s

Press Enter and follow the regular steps to format the disk. DOS automatically copies the files it needs to start—the system files (hence the /S switch)—onto the newly formatted disk. The /S switch stands for *system*. You even see an additional message stating `System transferred`, at the end of the operation.

Take your new emergency boot diskette, put a label on the outside saying what it is, and then store it in a safe place. Someday you are going to need this disk.

{Note} To start DOS with the emergency disk, just put it into drive A: before you turn your computer on. It can't fix computer problems, but it can get your computer started so that someone else can fix the computer problems.

Can I copy a floppy disk?

It's a good idea to make copies of important disks. Then, if something happens to the first, you still have the second. In fact, just about the first thing the manual of every software program you buy tells you to do, is to copy the disks before you use them. It also tells you to use the DISKCOPY command.

Get the disk you want to copy. It's called the **source disk**. Then get a blank disk that is exactly the same size and density as the source diskette. It's called the **target disk**. Label the diskettes so you know which is which.

<Caution> You can only use DISKCOPY to copy a disk to another disk that is exactly the same size and density. Unfortunately, it won't work with your PC's hard disk.

Keep these things in mind when you use DISKCOPY:

- Everything on the target diskette will be completely erased to make way for the new information.
- You don't have to format the target diskette first. DOS formats it during the DISKCOPY.
- If you mix up the source and target diskettes, you will have a perfect copy of a blank diskette. Not even UNFORMAT can fix this blunder.
- If the source diskette is damaged in some way, the copy will be damaged in the same way.

Will that be two drives...?

DISKCOPY is really easy if you have two floppy disk drives that are the same size and density. Type:

diskcopy a: b:

DOS prompts you to put the source diskette in drive A: and the target diskette in drive B:. Do it, then press Enter. DOS will make an exact replica of the disk in drive A: onto the disk in drive B:.

...or one?

Most modern computers don't have two floppy drives that are the same type, so today most of us make our copies using one drive and a bit of disk swapping. If you have two different sized drives, or only one drive, follow these steps:

1. Type **diskcopy a: a:**
2. DOS prompts you to put the source diskette in drive A:. Do it, and then press Enter.
3. After a while, DOS prompts you to put the target disk in drive A:. Take the source diskette out, and put the target diskette in. Press Enter.
4. Swap diskettes as many times as it takes until DOS is done. If DOS wants you to swap, there will be a prompt on the screen.
5. DOS asks if you want to copy another diskette. Press N.

{Note} Don't forget about software licenses and copyright laws when you start messing around with DISKCOPY. Copying someone else's software could be illegal.

And now a word about disk protection

There are things you can do to keep your disks safe. Since keeping your disks safe is the same as keeping your data safe, the following are all highly recommended activities.

Label your disks

Put a paper label on every disk you use. As soon as you format a disk, label it. That way, you'll know it's formatted. Once you store something on this disk, use a felt-tip pen to write the contents on the label. While you're at it, write the date, too. Floppy disks have a tendency to multiply, and unless you want to spend a lot of time using DIR to see what you've got stored where, get in the habit of labeling.

Write-protect your disks

On 3.5-inch disks, look for the little window in the top left corner. It has a tiny slider thing on the back that you can move up and down. When you push it down so the hole is covered, DOS can read and write to the disk. When you push it up so that the hole is open all the way through, DOS can read the disk, but can't write anything on it. (Go back and look at the page called "What size drive do I have?")

On 5.25-inch disks, look on the right side for a little notch near the top. If this notch is visible, then DOS can write on the disk. If the notch is covered, then DOS can't write on the disk. Cover the notch by wrapping it with one of the little black or silver tabs that came in the box of diskettes along with the diskette labels.

When you try to save or change anything on a diskette that has been write-protected, DOS says `Write-protect error writing drive A:` (or B:, if that's the case). This is a good thing! DOS is stopping you from overwriting stuff you thought was important enough to write-protect. Change the disk, and type **r** to retry the last command.

Use common sense

Here are some basic dos and don'ts of floppy care:

- Keep them clean and dry.
- Store them someplace safe.
- Don't keep them near magnets—even magnets in disguise, like electric motors, telephones, radio speakers, and paper clip holders (and the paper clips they contain).
- Don't let them get too hot or too cold—they'll melt or freeze.
- Use only a felt-tip pen to label them.
- Handle them only by the label.

7 How to Copy, Rename, and/or Move Your Files

I hate sharing my computer, don't you? When somebody wants to look at a form or newsletter I've created, I just give him or her a copy on a floppy.

In this chapter:

- How to duplicate a file...
- ...or a bunch of files!
- This file name is stupid. How can I change it?
- Moving files to a new home
- Copy files, directories, and the whole shebang at once

With the possible exception of DIR, the COPY command has to be the most commonly used command in the DOS-user's arsenal. COPY makes a duplicate of a file in the directory or drive that you specify. It's great when you want to make a backup copy of an important document for safekeeping. In an office where the PCs might be *networked*, COPY can be used to place files in a common directory so they can be accessed by co-workers.

For home users and PCs not connected to a network, copying files onto floppy disks may be the only way to share information with other people. (Better read Chapters 15, "Do You Know Enough about Viruses?" and 16, "Safe Computing—How to Protect Your PC from Viruses" before you start passing floppies around though.) COPY is also your primary tool for file management. Whenever you decide to rearrange your directories full of files, the chances are that COPY will be your first command choice.

When you copy a file, the original file stays right where it was, but another file has been created elsewhere. If you really want to *move* files from one place to another, this chapter will also tell you how to do that. You can even change a file's name. That's also in here, in a couple of different flavors.

What does COPY really do?

Using the COPY command is pretty much like using a copy machine. You indicate which one is the original (the one on the glass), and where you want the copy to go (in the bin, the sorter, the stapler/finisher, and so on). When the copying process is done, you have an original and a duplicate.

When you copy a file, DOS is actually creating a *new* file. This is an important point to remember for a couple of reasons:

- The more copies you make and use, the easier they are to confuse, especially if you copy to multiple floppy disks. Which version is the "real" one you're supposed to be working on?
- Multiple copies fill up disk space. The next chapter (Chapter 8, "Deleting All Those Darn Copies") explains how to solve this problem.
- If the destination you specify already contains a file with the same name as the one you're copying, the file already at the destination will be replaced by the incoming file. This is handy if you just want to update an existing file with a new version, but if you're not careful, important files can disappear forever!

Plain English, please!

What's all this **source** and **destination** stuff? Any DOS command that moves data from one place to another needs to know where to get the information and where to put it. The drive, directory, and file name that contains the data to be copied are collectively called the **source**. The place where the new copy will appear is called the **destination**. Sometimes the destination is also called the **target**, which means exactly the same thing.

What do you mean, it *replaces* the file?

Remember, you can't have two files with the same name in the same directory. This cold efficiency is one of the reasons why DOS makes new users uneasy. Starting with MS-DOS version 6.2, though, the good folks at Microsoft changed the command a little. COPY asks you to *confirm* that you want to overwrite an existing file. This is a great improvement.

Think of it this way. You may have a Rolodex cardfile of addresses and phone numbers for everyone you know. When somebody moves to a new address, you replace their old card with a new one, and toss out the old card. If you later decide you need the old card, you're out of luck because it's been replaced. The same thing happens when you copy a file with DOS, replacing an existing file with the same name. After you replace it, the old file is gone.

(Tip)

Use the COPY command with care. When you plan on making a copy of a file, use the DIR command first (see Chapter 6, "DOS Stuff You Can Do with Disks") to see what's already in the destination. Smart DOS users do this automatically.

Remember that only files *with the same name* can ever be replaced. BILL.DOC and BILL1.DOC are not the same file as far as DOS is concerned.

How to copy a single file

This is so simple, it's a wonder everybody isn't doing it for fun at parties. Suppose you really want to share a copy of your AUTOEXEC.BAT file with your friends. Switch to your root directory, put a blank formatted floppy disk in drive A:, and use this command:

copy autoexec.bat a:

If everything worked properly, you should see the message, `1 file(s) copied`. Congratulations!

Q&A

I got the message `Bad command or file name.`

OK, relax. You didn't type the command correctly. Make sure that you type **copy** (one space) **autoexec.bat** (one space) **a:** and press Enter. Remember that you can't have a space in a file name, so don't stick one on either side of the period, and never put one between the "a" and the ":". Spelling counts in DOS too!

What if the file is in a different directory?

If the file you want to copy is in a different directory from the one where you're currently working, add the path to the file name. Suppose you're currently in the directory C:\WORKBOOK, and you want to interrupt what you're doing to copy that AUTOEXEC.BAT file for your friend. You type the command this way, with C:\ added at the beginning of the file name so DOS knows that the file is in the root directory of your hard disk:

copy c:\autoexec.bat a:

Q&A

DOS says `File not found.` ***What happened?***

DOS couldn't find a file with the name you entered. You either spelled it wrong, or the file isn't located in the directory you specified. Check the path and file name.

I keep getting `Bad command or file name`

The COPY command has a finicky syntax that must be followed if everything is going to work. Imagine running up to the file clerk in your office and yelling, "Get me a copy, pronto!" The file clerk has no idea what it is that you want to copy, because you didn't say what or how many. In DOS, this vital information is typed as parameters that follow the COPY command:

copy (space) **original file** (space) **destination**

You type the command, COPY, followed by a space. DOS expects the next word to be the name of the file you want to copy, so type that name and the path if necessary. Press the space bar again and type the place where the file should go. Any time a parameter is used with a command, they must be separated from each other by spaces. (Otherwise, the file clerk won't understand, because you're slurring your words together!)

How to make a copy with a different name

Suppose you want to make changes in an existing file. But you also want to keep a copy of the original in case you totally screw it up with your changes. You can use COPY to do this too, but tell DOS to change the name of the file:

copy autoexec.bat autoexec.old

The message `1 file(s) copied` should show up on the screen. Notice that the destination in this command isn't a disk drive, but another file name. Since no faraway destination was specified, DOS simply put the new file in the same directory. This is perfectly safe, because the new file also has a new name.

(Tip)

If you try this with a file that's in another directory, make sure that you specify the proper path for both the source file name *and the destination*. Otherwise, you might copy the file to an unexpected directory. For example,

copy c:\autoexec.bat autoexec.old

places the new file in the directory where you are now, not in the root of drive C:. Better yet, change to the root directory before you even give the command and then you don't have to worry about paths at all.

How to copy seven (or more) with one blow

Suppose you have a directory filled with old documents you want to keep on a floppy disk. You can use the DOS wild card characters (* and ?) to copy entire groups of files. (See Chapter 4, "More Drive and Directory Stuff," for more information about wild cards.)

Let's say that your documents are located in a directory named C:\LETTERS and that they all share the same extension, DOC. Type the next two commands one after the other and press Enter each time:

```
cd \letters

copy *.doc a:
```

The first step changes the current directory to the directory containing the files. The second uses the COPY command as before, but with the wild card substituted where the first part of the file name would go. This command means *copy everything with DOC as the extension and place the copies on drive A:*.

When copying with wild cards, you may wind up copying one file, a hundred files, or no files at all, depending on how many file names fit the pattern used in the command. To avoid surprises, use the DIR command with that same file specification first (**dir *.doc**) to see the list of files that will be affected when you try the copy.

Now copy and rename at the same time

Here's how to copy a group of files to the floppy disk and change their names at the same time:

```
copy *.doc a:*.bak
```

The only thing different is that the destination combines two things together—copying to a disk drive and a new extension. The following table shows some examples of the results you might get from a command like this.

Old file on drive C:	New file on drive A:
MEMO.DOC	MEMO.BAK
LET2FRED.DOC	LET2FRED.BAK

(Tip)

Think of the wild card that's used in the destination as being *all the parts of the file name that you want to keep unchanged*. Anything else that's typed in the destination portion of the command will be a change made to the file name. So, because an **a:** was typed, the original files on C: will be copied to A:. And because a new file name extension was typed, all the DOCs will become BAKs.

Be specific with COPY: Tell it which directory to use

Let's say you have been saving your work all month long in a directory named C:\RECORDS. Now it's the end of the month and you want to copy the budget worksheet (called BUDGET.WK3) from C:\RECORDS into a new directory you've created, called C:\LASTMON. Use a command like this:

copy \records\budget.wk3 \lastmon

The directory names have been included in the command to help DOS find the location of the file to copy and the directory where it should go. In DOS circles, this is referred to as **specifying the path**. I prefer to think of this variation as specifying the address where the file lives: *Go to the \RECORDS directory and find the file named BUDGET.WK3. Copy it to a new home, located in the \LASTMON directory.*

(Tip)

By using the path to the file name as part of the command, you also avoid having to change to the RECORDS directory first. This is like moving files from one filing cabinet drawer to another without having to open the drawers. What can I say? It's magic!

Suppose you change your mind and decide that *all* the files in the RECORDS directory should be copied to \LASTMON. Just throw in a couple of wild cards:

```
copy \records\*.* \lastmon
```

The command still has only three parts with spaces in between. \RECORDS*.* is what you want to copy, while \LASTMON is where it's supposed to go.

{Note} DOS 6.2 users will be asked to confirm whether or not the BUDGET.WK3 file should be overwritten when all the files are copied at one time. (It was copied there before as an individual file, remember?) Just press **y** to say, "Yes, it's OK with me."

Other methods that save keystrokes

One day the company computer geek walks up to you. "Here's a diskette," he says, "with a directory named REPORTS that has a subdirectory beneath that named FINANCE. Get all the files from there and put them on your hard disk in a directory named FOOBAR. I'll see you tomorrow." He runs out of the office, while you clutch your chest and slide to the floor.

If you've been following the COPY command so far, you know that one way to enter the command would be like this:

```
copy a:\reports\finance\*.* c:\foobar
```

Of course, this command would work just fine, especially if you're not working on A: or in FOOBAR and don't want to change directories to do the copying. But the next couple of sections describe alternate commands you might also like.

{Note} It's impossible to copy a file into a directory that doesn't exist, so the following examples assume that you have already created the directory named FOOBAR on your hard disk. This is done with the command:

```
md \foobar
```

Copy to the default directory

DOS has one feature that most people learn to love—if you leave out a disk drive letter or a directory name, it assumes that you're talking about wherever you are right now—the current, or default, directory. Here's how it works. First, change to the directory where the files are supposed to go:

```
cd \foobar
```

Then, give only the first two-thirds of that COPY command:

```
copy a:\reports\finance\*.*
```

That's it! You don't specify a destination in the command, so DOS figures you want to copy those files to the directory where you are now. All the files just get sucked into the default directory. Use this version when you want to copy something into the directory where you're currently working.

This method of copying has lots of other advantages as well. If you have lots of different copies to do, changing to the target directory first will help you avoid retyping the same directory name over and over again. Also, if you mistype the directory name during a CD command, all you get is a little error message. If you mistype it during a COPY command, Lord only knows where your files will end up.

(Tip)

Change to drive A: before making backup copies of your files.

If you want to back up all the files in a directory onto a floppy diskette, switch to the floppy drive first and then give a command like:

```
copy c:\reports\*.*
```

By making the floppy drive the default drive first, and then leaving all references to it out of the **copy** command, you can more easily verify the copies with **dir** and can also perform other operations on the copies (such as renaming them).

Copy from the default directory

Now suppose that you're already working where the files are, and you need to copy them somewhere else. You can tell DOS to *send* the file to the place

where you want it. In the previous example, you changed *to* the FOOBAR directory to save keystrokes during the copy. Unfortunately, the path to the source files was even longer and still required some long and careful typing. You can make the copy command even shorter and easier by making the source directory the default first. Switch to drive A: like this.

```
a:
```

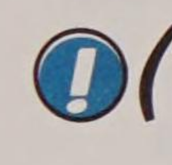
Then, change to the directory where the files are.

```
cd \reports\finance
```

Now that you've found the directory, you need to copy the files from there to the FOOBAR directory on drive C:. Try this:

```
copy *.* c:\foobar
```

It's that simple. DOS copies all the files from the current directory on the floppy disk to drive C:, in the directory FOOBAR.



When copying from one directory to another, use the CD command to change to one of those directories first. Then you can simply leave any references to that part of the path out of the command. Since the commands become less complicated, you reduce your chances of making a typing mistake that sends your files off to some unexpected destination.

A better method for renaming files

The trouble with copying a file and changing its name at the same time is that you wind up with two copies of the file. What if you only wanted one? DOS provides a neat little command that does it quickly and far less painfully than COPY. The command is RENAME. If this makes too much sense to you and seems just too easy to be DOS, then type what *everybody* else types—REN, which is shorter and suitably cryptic to be a DOS command.

If you have a file named BUDGET.NEW and you want to change it to BUDGET.OLD, just type the following:

```
ren budget.new budget.old
```

This really resembles the COPY command, spaces and all, but it's much easier because you don't need to specify all kinds of drives and directories. Remember that, unlike the COPY command, REN doesn't create a new file. The original file simply has its name changed.

(Tip)

The REN command doesn't like it if you enter something like this:

ren a:\myfile.doc c:\yourfile.doc

There are two different drives entered in this command and that means the file has to go from one place to another. No can do. REN only changes a file's name and keeps it in the same location. The above command would have worked if it had been a COPY.

If you *must* use a path in the command, (either because the file is not in the current directory or you don't feel like changing to that directory), then use the path with the *first file name only*. The second name in the parameter doesn't need another path because the file doesn't go anywhere.

I got Duplicate file name or file not found

Not to worry. You issued the REN command and one of three things happened:

- DOS couldn't find the file because you're not in the right directory.
- You mistyped the file name it's supposed to change.
- You entered a new name that already exists.

Use the DIR command to verify the file's name and location and try again. (See Chapter 4, "More Drive and Directory Stuff," for more info on DIR.)

How to move files from place to place

Make no mistake about the difference between COPY and MOVE. With COPY, you get two separate files. With MOVE, you still have only one file, but

in the new location. If I move to New York, there I am! If I could *copy* myself to New York, it would be a miracle of science.

MOVE is only available to people who use DOS version 6 and later. If you want to move files using anything earlier than DOS 6, you'll have to COPY the files and then delete the originals. (The DEL command is explained in Chapter 8, "Deleting All Those Darn Copies.")

Suppose you decide to clean up your hard disk by moving some old reports from C:\REPORTS to a floppy diskette in drive B:. First, change to the correct directory and then use MOVE:

```
cd \reports

move *.rep a:
```

This moves all files with the extension REP to drive A: Naturally, it's possible to move one file at a time by typing the complete name instead of using a wild card.

{Note}

MOVE works exactly like COPY in every way. If you want to type drive letters and long directory paths, they will be accepted without any fuss or error messages. (Unless you type them wrong. It's just like COPY in that respect too.)

You can even have MOVE change the name of the file while it's "in transit." Actually, this only works when you move one file at a time. If you try moving and renaming with wild cards, you get an error message. Don't ask. It doesn't make sense to me either.

How to copy a directory and all its subdirectories

DOS has one other nifty command that goes by the mysterious name of XCOPY. This command was added a few years ago to respond to users demanding the ability to copy entire directory tree structures with one command. (Chapter 3, "Get Started with the DOS Filing System," and Chapter

13, "Restoring the Backup (and You Will)," tell you everything you need to know about directory trees.) The old COPY command only works with one directory at a time, which can cause untold keyboard injuries, like blisters and calluses, if the command has to be retyped again and again.

Copying entire directory trees

Here's the scenario: The office techno-geek shows up at your desk again, and demands that you copy all the files from his floppy diskette onto your hard drive. The diskette has files in the root directory, as well as two subdirectories that also contain files. He lumbers off in search of pizza, and you smile to yourself because you have the tools!

Make a subdirectory on your hard disk, where the diskette's file structure will begin. I like GEEKDISK, don't you?

```
md \geekdisk
```

Then, type the following:

```
xcopy a:\ c:\geekdisk /s
```

It looks pretty much like a regular COPY command except for the addition of that /S switch at the end. The /S switch translates to "and all the subdirectories you can find." The translation of the command then is *copy all the files from the root directory of drive A: to a subdirectory named GEEKDISK on drive C:. While you're at it, get all the subdirectories you can find and reproduce them under GEEKDISK as well.*

{Note} The regular old COPY command doesn't like it if you try to add a /S to the command. The only way to copy multiple directories is with XCOPY.

8 Deleting All Those Darn Copies

In this chapter:

- Delete your unwanted file
- Delete a bunch of files at once
- Use F3 to save keystrokes (and prevent errors) when deleting
- Oops! Can I *un*delete a file?
- Improve your chances of a successful undelete

If you liked Chapter 7, "How to Copy, Rename, and/or Move Your Files," you'll love this one! Now you get to destroy all those things you just created!

We all have to clean out desk drawers and filing cabinets every so often, and hard disks aren't any different. If files were never deleted, there would soon be no room for anything else on most disks. You may be removing an old program that you never use anymore, or you might be cleaning up old files that you've already copied to floppy disks for safe-keeping. Either way, you're deleting files.

And sometimes you need to pull those papers back out of the trash, right? Recent versions of MS-DOS even provide for this; you can bring back files after you've wiped them out.

What happens when I delete a file?

The DOS command to delete a file is DEL. The correct syntax for deleting a file is:

del ***filename***

That's it. When you press Enter, whatever file name you specified is gone. You aren't asked to confirm your decision and DOS won't even tell you the delete was successful, as you'll see in the next few examples.

{Note} If you prefer, you can use the command ERASE rather than DEL. It works the same way, but requires a few more keystrokes.

Remember that this command is used to clean up old files you know you'll never need again, or to remove cases of *duplicate* files from a disk. Unfortunately, you can't just go around practicing this one.

{Tip} Actually, you *can* practice deleting files if you put a blank formatted diskette into drive A: and copy a few files onto it. (Copying is discussed in Chapter 7, "How to Copy, Rename, and/or Move Your Files.") Then switch over to drive A: and start deleting. The original files will be safe because they're still on the hard disk.

Remember that the commands COPY and MOVE aren't the same thing. Don't *move* your files to A: before deleting them, just *copy* them.

How to delete a single file

If you followed along in early chapters of this book, you might have an example file called TESTFILE.TXT hanging around on the root directory of your hard disk. Mine is visible in the directory listing in figure 8.1. To delete this file, switch to the directory containing TESTFILE.TXT (or some other suitable file, if you just want to follow along here), and then type:

del testfile.txt

Press Enter. Nothing much happens right? DOS doesn't believe in positive motivation, so no congratulations pop up on the screen. The file really is deleted though, and another DIR command will quickly prove it.

```
WINFAX          <DIR>          05-02-94  10:59p
WINGIF          <DIR>          04-04-94  11:25p
WINWORD         <DIR>          04-04-94   1:18p
WK1S            <DIR>          04-24-94   1:08a
WP51            <DIR>          04-02-94   1:10a
WRK             <DIR>          04-04-94   3:24p
AUTOEXEC BAT              206 10-23-94  12:51p
COMMAND  COM           54,619 09-30-93   6:20a
CONFIG   SYS              336 10-23-94  12:39p
METRO    EXE           51,904 02-29-88  12:00a
TESTFILE TXT               36 11-09-94  10:33a
       52 file(s)        107,563 bytes
                      18,579,456 bytes free

C:\>del testfile.txt

C:\>dir testfile.txt

 Volume in drive C is CONFUSING
 Volume Serial Number is 1DF2-097A
 Directory of C:\

File not found

C:\>
```

Fig. 8.1
The DEL command does its job quietly and efficiently. The last command typed in this figure shows that TESTFILE.TXT was definitely deleted.

(Tip)

Don't assume that DOS's silence in this command means it refuses to delete the file. If it didn't like something, it would have been very quick to give you an error message. (Just a case of "no news is good news," I guess.) If you try to delete the file again, you'll get a `File not found` error, because it worked the first time.

Can I delete a file in another drive or directory?

Just as all other DOS commands allow you to type drive letters and directory paths as part of a file name, the DEL command can be used to delete files elsewhere in your system. Specify the path to the file's location as part of the command line, such as the following:

```
del a:\autoexec.bak
```

This example deletes the file named AUTOEXEC.BAK from a floppy disk in drive A:. Notice that there is no space between the drive letter and the file name itself. If the file you want to delete is in another directory, the command is similar:

```
del \lotus\files\budget.wk3
```

This command will delete the file named BUDGET.WK3 from the FILES directory, which is a subdirectory of the LOTUS directory. Again, the only space in the entire command comes right after DEL.

A little more dangerous: delete with wild cards

Using wild cards turns DEL into the electronic equivalent of thermonuclear war. Now you're playing with power. The question mark (?) and the asterisk (*) still work exactly as with DIR, COPY, MOVE, and all the other commands. The difference is that here, you're deleting.

If you had just made floppy disk copies of all your work in a directory named LETTERS, you could delete the originals with this command:

```
del \letters\*.let
```

The asterisk says "accept any file name," while the trailing period and LET say, "but the files' extensions must be *LET*." Depending on how many files in that directory have LET as the extension, you could be deleting one file or five hundred. It is pretty nifty, I'll grant you, but it's always better to check with the DIR command before you start wiping things out with wild cards. As before, DOS doesn't ask if you're sure and doesn't tell you what it deleted.

(Tip)

DOS can prompt you before deleting every file when you use wild cards.

Obviously, deleting with wild cards can be a pretty scary experience. Luckily, the **del** command comes with safety belts and an airbag as optional equipment. If you use the **/p** switch at the end of the command, DOS will stop on *every file* that fits your wild card and will ask if you want to delete it or not. You have to type a "Y" to delete the file and an "N" to change your mind.

You can even delete all the files at once (are you sure you want to?)

The only exception to this code of silence by DOS is when you tell it to wipe out everything in the directory by typing:

del *.*

At last, DOS asks if you're sure about something (see fig. 8.2). Newer versions of DOS actually state that all the files are about to be deleted. Older versions simply say `Are you sure?` without telling you what to be sure of.

```
SCRDOS        <DIR>          11-08-94  11:39a
SYMBOLS       <DIR>          04-24-94  12:31a
TROUBLE       <DIR>          04-24-94  12:25a
UTIL          <DIR>          04-02-94  12:29a
WAVES         <DIR>          04-04-94   3:56p
WIN           <DIR>          03-31-94   6:21p
WINFAX        <DIR>          05-02-94  10:59p
WINGIF        <DIR>          04-04-94  11:25p
WINWORD       <DIR>          04-04-94   1:18p
WK1S          <DIR>          04-24-94   1:08a
WP51          <DIR>          04-02-94   1:10a
WRK           <DIR>          04-04-94   3:24p
AUTOEXEC BAT              206 10-23-94  12:51p
COMMAND  COM           54,619 09-30-93   6:20a
CONFIG   SYS              336 10-23-94  12:39p
METRO    EXE           51,904 02-29-88  12:00a
TESTFILE TXT               36 11-09-94   2:05p
       52 file(s)        107,101 bytes
                      16,744,448 bytes free

C:\>del testfile.txt

C:\>del *.*
All files in directory will be deleted!
Are you sure (Y/N)?
```

Fig. 8.2
This command is being used to prove a point. Right away, the author typed "N" for No!

{Note}

The only time that DOS ever asks `Are you sure?` is when you have typed the command, **del *.***. Other dangerous commands give other messages, but nothing else says those exact words. If you see these words and you're *not* sure, type **n** (for NO) and press Enter.

Be careful: * may not do what you expect

You already know that typing *.* in a DOS command means, "Accept all the file names, and all the extensions." You may not be aware that other wild card combinations may accidentally be interpreted by DOS as being *.* as well.

The fact is that the asterisk can only be placed alone in the file name, or after other characters. It can never appear before any typed characters. To test this, it's better to use a nondestructive command like DIR. If you want to see any file names that begin with F, but have any extension, you type:

dir f*.*

However, there is no easy way to quickly see all the files that *end* with F. When you type:

dir *f.*

DOS will interpret the parameter as *.*!

Try it yourself on your own machine. Every file name in the list will scroll by. This is because DOS reads your commands from left to right, just as you do. When you type something and press Enter, it finds the first blank space in the command and assumes that everything before the space is the command word. Everything after it must be the parameter. If the first parameter it sees is an asterisk, then *it just jumps directly* to the period to see if there is an extension. You can type the entire Gettysburg Address after an asterisk and DOS will ignore it. Figure 8.3 shows how misplacement of the asterisk can affect the DEL command.

```
C:\>cd \dos

C:\DOS>del *IN1492COLUMBUSSAILED.*FOURSCOREANDSEVENYEARSAGO
All files in directory will be deleted!
Are you sure (Y/N)?
```

Fig. 8.3
Find the asterisks in the DEL command. Never use an asterisk before any other characters in a file name or the results can be disastrous!

So how do I delete a group of files without using *?

You have to use the question mark, which replaces only one character. The problem with this is that you have to enter the same command over and over again, searching for file names of different lengths. For example, ??95.* will affect *four-character file names* ending in 95, ???95.* will affect *five-character file names*, and so on.

You can get around this by giving some thought to your file names before you save them. If you plan on working with several files for the year 1995, then make the 95 the *first characters of the name.* Then you can manipulate your files more easily using 95*.* as a wild card.

(Tip)

If you're running into this kind of problem a lot, you can use the DOS Shell or Microsoft Windows' File Manager to mark files for deletion. When you hold down the Ctrl key and click on a series of file names with your mouse, you can select each file randomly and not worry about wild cards. It saves a lot of keystrokes.

Save typing with the F3 key

There is no question that wild card characters, directory names, and drive letters all combine together to give us a big collective headache. They are confusing to everybody—not just new users. And if you combine them with the DEL command, the results can possibly end up in disaster.

Function key F3 to the rescue! Whenever you press F3 (that little key with the F3 on it—not F, then 3), DOS will retype your last DOS command for you. Go ahead and try it. If the last command you typed was `del testfile.txt`, there it is again! You can use Backspace to erase it from the command line if you like. Now here's how to use it with DEL.

Let's say you want to erase all the files that have 94 as their extensions. To complicate matters, the files are in a directory on drive A: named BUDGETS. Try using the DIR command with all the weird parameters first. When you see all the correct file names go by on the screen, you know you've found them. The proper DIR command would be:

dir a:\budgets*.94

Now, you get to use the F3 key to do most of your typing. Type:

del

and nothing else! Then press function key F3; the parameters from the DIR command appear magically after the DEL command. Now it looks like this:

del a:\budgets*.94

When you typed the three characters, **del**, you replaced the three characters, `dir`, but not the parameters of the command. Now you can press Enter, fully confident that you will only delete the files you viewed as part of the directory.

(Tip)

Whenever you want to delete files and are a little unsure of how to use the wild cards or directory names, always try a DIR first to check your syntax. If the DIR works as expected, then type DEL and press F3.

Remember the ERASE command mentioned earlier? It won't work with the F3 trick, because it has a different number of characters than DIR.

Now would be a good time to undelete

The unthinkable has happened and some saboteur has erased a vital file from your disk. Luckily, beginning with version 5 of MS-DOS (and all the ones after that), the UNDELETE command became available.

Suppose you have accidentally erased a file named MAKEMY.DAY. Be sure you are in the same directory where the file was originally located; then enter this command:

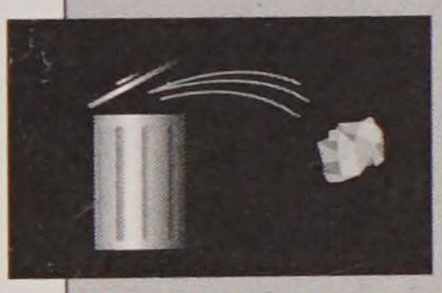
undelete makemy.day

You'll see a bunch of techno-drivel pop up on your screen, but then it will show you your file (with a question mark where the first character should be). DOS asks if you want to undelete the file (see fig. 8.4). Type "Y" and it will ask for the first character. Type the "M" and the file will reappear!

Fig. 8.4
When you supply the first letter of the deleted file, DOS can usually perform a successful undelete.

```
UNDELETE - A delete protection facility
Copyright (C) 1987-1993 Central Point Software, Inc.
All rights reserved.

Directory: C:\
File Specifications: MAKEMY.DAY

    Delete Sentry control file not found.

    Deletion-tracking file not found.

    MS-DOS directory contains    1 deleted files.
    Of those,    1 files may be recovered.

Using the MS-DOS directory method.

      ?AKEMY   DAY    14859  2-18-93  5:00p  ...A  Undelete (Y/N)?y
      Please type the first character for ?AKEMY  .DAY: m

File successfully undeleted.


C:\>
```

How does UNDELETE work?



There are two places where information is stored on a disk—the place where the data for the file is located, and the directory where the name appears. This is like a library where the books are placed on a shelf, but you find them by looking up the index cards in a drawer.

When you delete a file with DOS, the data is not actually erased from the disk. Instead, the first letter of the file name is erased from the directory. You are removing the index card from the drawer, but the book is still on the shelf.

If you place another file on the disk after deleting something, DOS will think that the space on the shelf is available and will overwrite the old data. If you haven't made any new files, the old data is still there, untouched. Typing the first letter of the name is like replacing the index card in the drawer.

Does undeleting always work?

Your chances of undeleting a file go down dramatically if you have done a lot of work with your disk since the file was deleted. If you realize your mistake right away, you'll probably get the deleted file back without any fuss. If you've been saving, copying, and moving stuff around, DOS may not be able to figure out where the data was originally located. When this happens, UNDELETE regretfully informs you `The data contained in the first cluster of this directory has been overwritten or corrupted.` This is tech-talk for, "Tough luck. Hope you had a backup!"

How to undelete a group of files

If you want to see quickly what files have recently been deleted from your directory, you can use **undelete /list**. The /LIST parameter displays all the deleted file names that DOS knows about and will also tell you if any of them can be successfully undeleted (see fig. 8.5). From that point you can use UNDELETE to recover anything that you see in the list.

Fig. 8.5
UNDELETE /LIST shows 10 deleted files, but only the first 3 can be successfully recovered. The others have since been overwritten by other data.

```
    Deletion-tracking file not found.

    MS-DOS directory contains   10 deleted files.
    Of those,    3 files may be recovered.

Using the MS-DOS directory method.

      ?AKEMY   DAY     14859  2-18-93  5:00p  ...A
      ?UTOEXEC BAK       206 10-23-94 12:51p  ...A
      ?ET2MOM  DOC     51904  2-29-88 12:00a  ...A
   ** ?A0363   EXE    184599  6-11-94 12:59p  ...A
   ** ?IRROR   FIL    158208  9-21-94  1:59p  ...A
   ** ?IRROR   BAK    158208  9-19-94  4:18p  ...A
   ** ?UEDATES           1706  9-06-94  5:28p  ...A
   ** ?CANDISK LOG        461  4-23-94 10:39p  ...A
   ** ?PIN_LOG C         8792  4-06-94  4:04p  ...A
   ** ?ESTFILE TXT         36 11-09-94  2:05p  ...A


  "**" indicates the first cluster of the file
       is unavailable and cannot be recovered
       with the UNDELETE command.

C:\>
```

You can also use the UNDELETE command with wild card characters instead of a single file name. You can type **undelete *.doc** or **undelete *.***—just about anything you want. You will be asked if you want to recover each file, one at a time. For everything where you answer, "Yes," you must type the first letter of the name.

How do I increase my chances of a successful undelete?

MS-DOS version 6 and higher provides a number of tools that will improve your chances of successfully recovering deleted data. Which ones you use depend on how often you accidentally erase a file (and how soon you realize it).

Delete Sentry

This feature creates a hidden directory on your hard disk and actually copies all the files you ever deleted into it. Whenever the directory reaches 7% of the total disk space, older files are automatically removed forever. You must load this feature every time you turn on your computer by typing **undelete /s**. All deletions after that are automatically saved. If you are deliberately deleting files to free up disk space, turn Delete Sentry off with **undelete /u**.

(Tip)

If you decide to turn off the Delete Sentry while freeing up disk space, don't forget to turn it back on again with **undelete /s**. Otherwise, you won't have any delete protection at all.

Delete Tracker

This is less effective than Delete Sentry because it really does allow the file to be erased. It simply keeps track more accurately of where the file originally existed on the disk. If a file has been overwritten, Delete Tracker cannot get it back. You must load this protection feature manually as well, by using the following syntax:

undelete /tc

The /T tells DOS to load the tracker into memory, but the C is required to tell it what drive it should be tracking (in this case, the hard disk).

{Note}

Both Sentry and Tracker require you to type the command that loads them *every time you turn on the machine*. Therefore, most people choose to have them load automatically by putting the command in the AUTOEXEC.BAT file. Ask a techy-type person for help, or check out Chapter 10, "What Happens When You Start Your Computer," and Chapter 11, "How to Edit Startup Files with the MS-DOS Editor (and Without It)."

Defragment your hard disk regularly

DOS has a useful command called DEFRAG (see Chapter 14, "Good Things You Can Do for Your Disks") that rearranges the files on your disk to make sure that all the various parts are located one-right-behind-the-other. This **defragmentation** process makes the files **contiguous** (con-TIG-you-us). It makes file accessing faster, saves wear and tear on your drives, and *greatly enhances your chances* of recovering a deleted file if you choose not to use Sentry or Tracker. Here's the bad news. DEFRAG moves all the parts of your files around, so that if you delete a file and *then* defragment your drive, you probably won't be able to get your file back afterwards. Undeleting works best on drives that are *already* defragmented.

9 Organize Your Disk with Directories

Directories can get pretty confusing. It's easy to forget where you are. It's even easier to copy a file to another directory and then not remember where it went!

In this chapter:

- What are directories for?
- A good directory structure takes some planning
- How to add directories
- How to get around in your directories without getting lost
- Can I get rid of directories I don't need?
- Slick tricks for renaming a directory

Chapter 3, "Get Started with the DOS Filing System," introduced how directories allow you to create a logical and orderly structure for all your files. This chapter takes you deeper into how those tree structures operate, how to manage them, and how to create one that's suitable for your needs.

Why do I need directories?

You already know that DOS doesn't allow two files with the same name in the same directory. That's because you copy files by using the file names, delete files by using their names, and save and retrieve files in your programs by using their names. Two files with the same name can exist on the same *drive*

however, if they are each stored in different directories. That's because the drive letter and the directory name are all actually part of the file name—much like how two different addresses can help you tell which John Smith in Milwaukee is the one you want to visit.

{Note}

Almost every software program ever written comes with a file named SETUP.EXE or INSTALL.EXE, which copies the program files from floppy onto the hard disk and tells the program about the kinds of hardware you use. For example, WordPerfect 5.1 places its INSTALL.EXE in a directory named C:\WP51 and Lotus 1-2-3 places its INSTALL.EXE in a directory named C:\123. As far as DOS is concerned, C:\WP51\INSTALL.EXE is a different file than C:\123\INSTALL.EXE because the addresses are different.

Think about this for a minute. Suppose you have a file containing sales figures for May 1995, and you name it MAY.95. Sounds like a perfectly good name, but don't you have other information about that particular month that could also use that name? What about budgets, inventories, payroll, and other stuff? They can all use the same file name if you keep all the files separated by topic in their own directories:

- C:\BUDGETS\MAY.95
- C:\PAYROLL\MAY.95
- C:\SALES\MAY.95

Considering how much bigger hard disks get every year, it's a good thing you get to split up your files into directories. Otherwise you'd probably start to run out of good descriptive file names before long.

What directories do I have now?

The best way to become familiar with directory structures is to view the directories that exist already on a hard disk. This is done with the TREE command. In order to view all the subdirectories on a disk, you must first be at the root directory (the main directory from which all the other directories branch). Type **cd ** to get there, then type **tree**. Figure 9.1 shows an example of the results of the command.

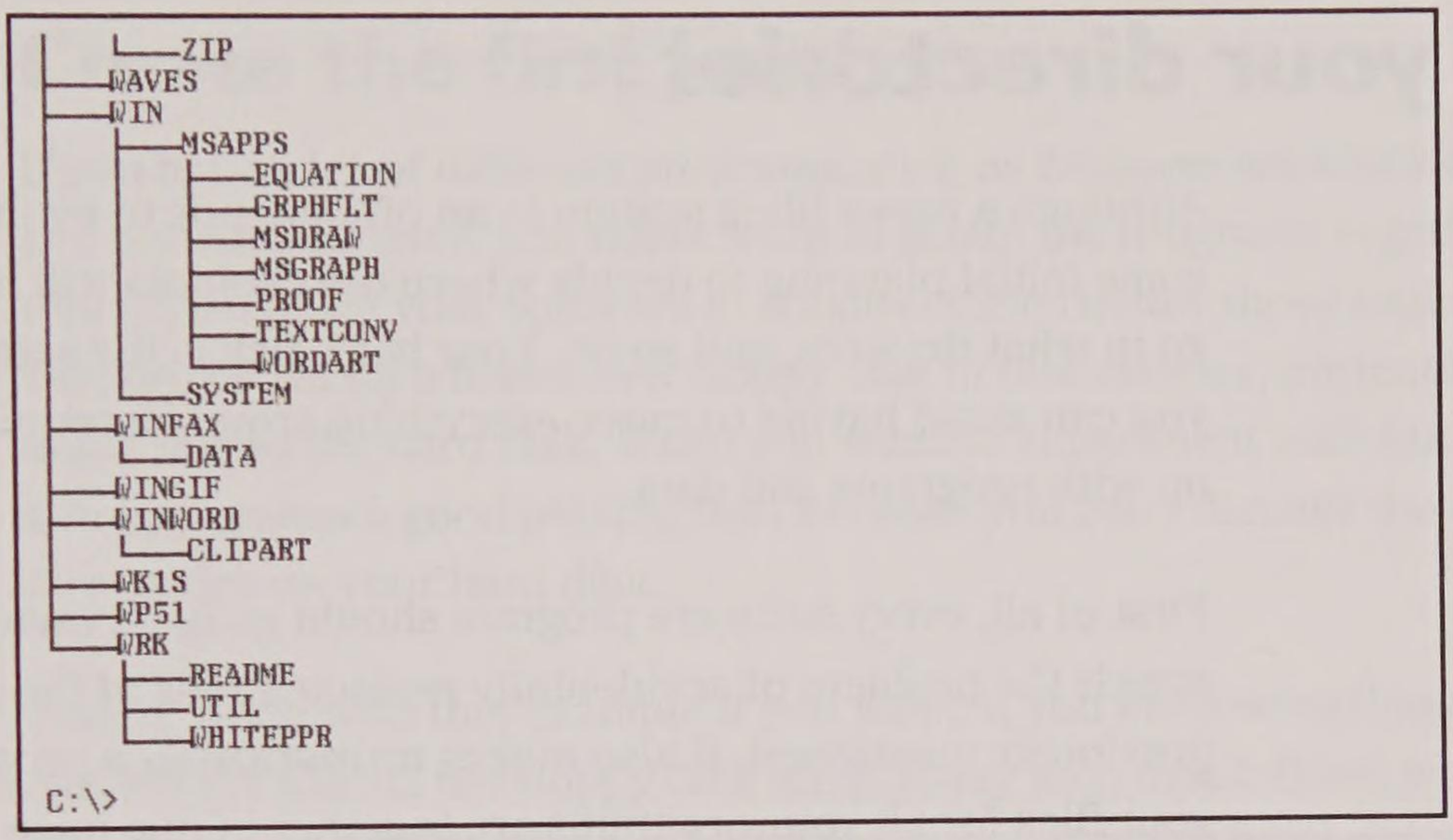


Fig. 9.1
The TREE command lists the directories on the disk in much the same way as DIR lists the files in a directory. Your tree may not be as complicated. This one was 7 screens long!

When you read the results of the TREE command, start at the left-most side of the screen. That's the root directory. About 1/2-inch to the right is the first level of directories. If any of these has subdirectories, they are listed another 1/2-inch to the right. The deeper your **tree** (or **directory tree**) goes, the farther across the screen the report goes. (No, I don't know what happens when your tree structure is so deep that it fills the screen. In 15 years, I've never seen one that complicated.)

(Tip)

If you only want to see the subdirectories in the *current* directory, just type **tree** at the prompt and press Enter (without changing to the root directory first). If there aren't any subdirectories in that directory, DOS says something like `No sub-directories exist`.

Take a second to examine figure 9.1 closely. It shows directories named WAVES, WIN, WINFAX, WINGIF, WINWORD, WK1S, WP51, and WRK. Notice that the directory named WIN has two subdirectories—MSAPPS and SYSTEM. The directory named MSAPPS has seven different subdirectories beneath it.

{Note}

If your tree is too long to be seen on the screen at one time, you have two options. You can use the **tree¦more** command to pause at every screen full. (The ¦ character is on the same key as the backslash.) In fact, ¦MORE can be added to the end of *any* command in DOS that extends beyond one screen.

Or, you can print the results by typing **tree>prn**, which redirects the output to your printer.

Plan your directories

Although a paper filing system in an office tends to evolve over time, it takes some initial planning to decide where the cabinets will be placed, what files go in what drawers, and so on. Your hard disk is the same. By thinking ahead, you can avoid having to move everything around later as your hard disk fills up with programs and data.

First of all, every software program should go in its own directory. This avoids the problem of accidentally replacing files of the same name, as previously mentioned. It also makes **uninstalling** a program easier. If all your files for all your programs are together in one huge directory, you will have a devil of a time figuring out who goes with what when you want to erase or upgrade an application.

{Note}

DOS limits the number of files you can mash together in the root directory of any disk, hard or floppy. When you reach that limit (for example, 512 files and directories on a typical hard disk), DOS won't let you put anything else on that disk. Yet another good reason to use subdirectories.

Now start making your own directories

Grouping files and programs into directories makes your file listings shorter. Whenever you DIR a directory, there's a good chance that most of the file names will fit on one screen. If files are easy for you to find, they're easier and faster for DOS to find too.

Create the first level

If you have a lot of different programs, such as business applications, games and personal finance, you might want to group the programs together by topic, then place your software in subdirectories below those topics. For this section, I'll set up a brand new floppy disk in that manner, pretending that I'm doing this to the hard disk. When you want to experiment with filing systems, a floppy makes a good playing field because you can't damage the existing directories on your hard disk.

Follow along with this example if you want; if you mess something up, you can always format the floppy disk after. Every step that follows works equally well on the hard disk. *Just don't make A: the current drive first.*

<Caution> If you want to play with the creation and deletion of directories, experiment on a blank floppy diskette. That way you don't trash your hard disk with all its valuable files. Once you get good at it, you can throw away the training wheels and muck around in your hard disk to your heart's delight.

First let's make a directory for DOS, and then directories for business, games, and personal finance. The command to make directories is MD. Use figure 9.2 as a guide.

1. Switch to the floppy drive by typing **a:** and pressing Enter.
2. Now enter each of these commands, one after the other:

   md dos

   md business

   md games

   md personal

3. Type **tree** to see the fruits of your labors. Your screen should be similar to figure 9.2.

```
C:\>a:

A:\>md dos

A:\>md business

A:\>md games

A:\>md personal

A:\>tree
Directory PATH listing
A:.
├──DOS
├──BUSINESS
├──GAMES
└──PERSONAL

A:\>
```

Fig. 9.2
Every time you type MD followed by a name, you create a new directory. Because you were at the root directory (A:\), all the new directories branch off the root.

{Note}

Directories follow the same naming rules as files. You can't have more than eight characters in the directory name and most punctuation characters (including blank spaces) are illegal. Although it is possible to assign a three-character extension to a directory name, this is seldom used because the names just get too long to type.

And now the second level

The DOS directory doesn't usually have any subdirectories, but the other three will. To make the directories that will appear under BUSINESS, change to that directory first. Then create directories for WordPerfect and Lotus 1-2-3. Follow these steps:

1. Type **cd business** and press Enter. Your prompt should change to A:\BUSINESS.

2. Now enter these commands to create directories for WordPerfect version 5.1 and Lotus 1-2-3:

   md wp51

   md lotus

3. Use the **tree** command to see the new directory structure (see fig. 9.3).

Fig. 9.3
TREE looks at the current directory (and below) unless you specify a path to the root as part of the command.

```
A:\>cd business

A:\BUSINESS>md wp51

A:\BUSINESS>md lotus

A:\BUSINESS>tree
Directory PATH listing
A:.
├──WP51
└──LOTUS

A:\BUSINESS>tree \
Directory PATH listing
A:\
├──DOS
├──BUSINESS
│   ├──WP51
│   └──LOTUS
├──GAMES
└──PERSONAL

A:\BUSINESS>
```

What's this? The two new directories are there, but where did the other four go? Remember that your default directory right now is BUSINESS. DOS is showing you all the directories that it sees from there. If you want to see the entire directory tree of the disk, you have two choices. You can change back up to the root directory yourself with **cd **, or you can add a parameter to the TREE command that tells it to start its report from the root:

**tree **

Climbing around in the DOS tree

Take a look at figure 9.4 to see the structure of the disk so far. At the moment, you're in the BUSINESS branch. What do you do to get to the GAMES branch and add subdirectories there? Well, you'd have to climb back to the root directory and then move out on the branch you want (GAMES). Like this:

cd\games

Adding the backslash (\) tells DOS to go back to the root and then look for the directory whose name appears after the backslash.

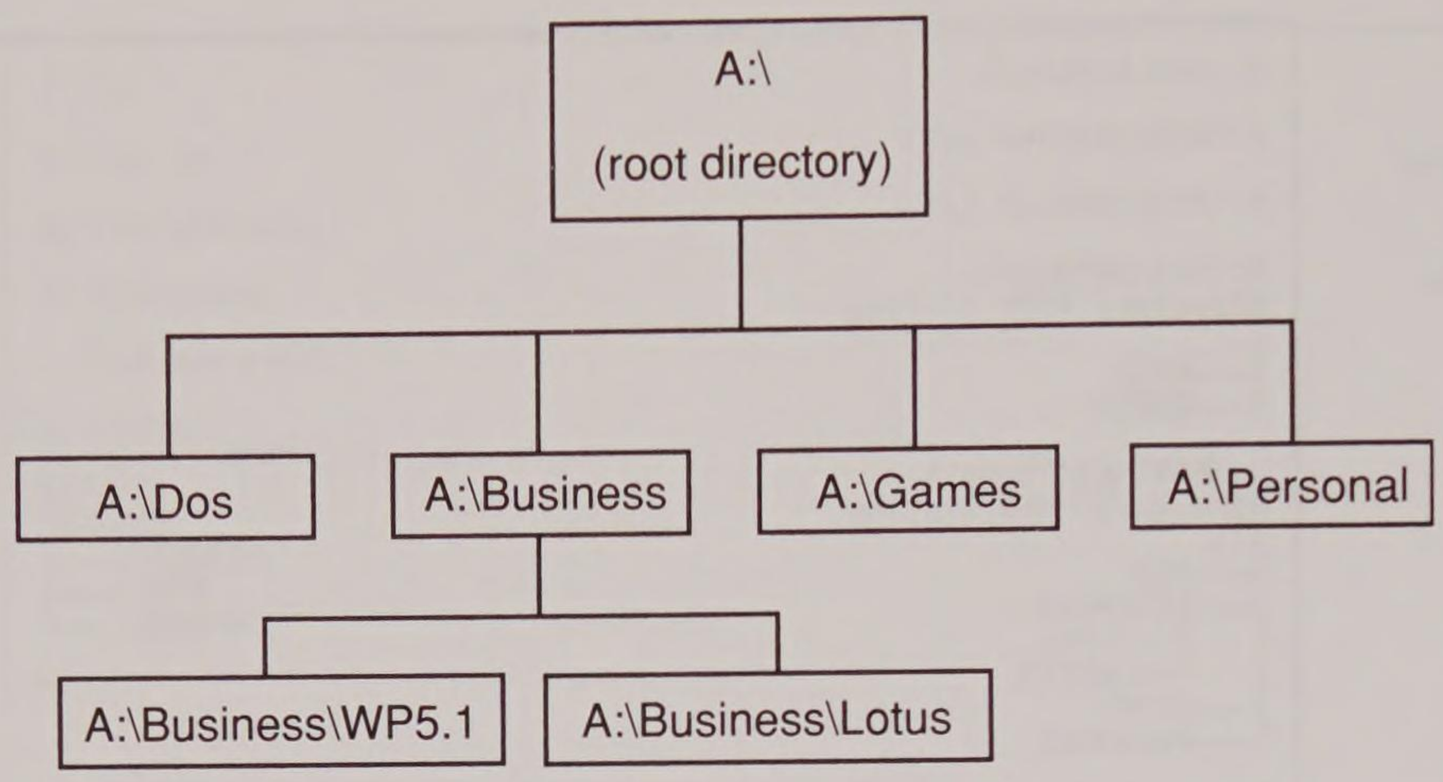


Fig. 9.4
You could switch to the GAMES directory by two steps: **cd** to get to the root and then **cd games** to get to the GAMES directory, but why not combine them?

If there is no such directory as GAMES, DOS will say so—`Invalid directory`. Remember that DOS only looks where you tell it to—and doesn't have enough sense to search the entire hard disk for the directory you specify.

Okay, now you're in the GAMES directory. How do you get back to the LOTUS directory?

cd \business\lotus

The first backslash means, "Return to the root," and the second backslash is used as a kind of separator to tell DOS it will have to change directories again. Your prompt will change to A:\BUSINESS\LOTUS.

How do I go back up the directories one level at a time?

Want to go back up the branches of the tree by one level? To return to the BUSINESS directory, there are two ways to get there. You could type **cd\business** which means, "go back to the root and then turn around and come back down to the BUSINESS directory." This works, but requires more typing than you need to do. Any time you want to go up *one level* in a directory structure, you can type this:

cd ..

This would take you from A:\BUSINESS\LOTUS to A:\BUSINESS. You have seen the "dot" and "dot-dot" directory entries that are created every time you

make a subdirectory in DOS. DOS uses them internally for its own navigation around the tree (you might say it *connects the dots*). But you can use the "dot-dot" yourself whenever you want to move from a **child** directory to its **parent**. Think of this as taking advantage of a undocumented feature in DOS.

> **Plain English, please!**
>
> If you compare a directory tree to the usual graphic explanation of a family tree, you can see how some directories can be called **parents** and some can be called **children**. In the tree that we have created on drive A:, BUSINESS is the parent of LOTUS and WP51. You can also say that BUSINESS is a child of the ROOT directory, since all directories have to be below the root.

How do I get from a directory to its subdirectories?

If you're already in the BUSINESS directory and you want to work in the WP51 directory, you don't need to bother with typing any slashes. Since WP51 is a child of BUSINESS, DOS can find it pretty easily. Type:

```
cd wp51
```

You only type the leading backslash when you want to return to the root, or when you have to *go through* the root directory to get to another directory.

I don't understand when to use this backslash!

It really does help if you envision the directory system on a disk as being the branches of a tree (and you're climbing around in it). When you are in the root directory, you are clinging to the trunk. If your prompt says you're in a directory, then you're out on one of the branches. Go one more level down and you have moved farther out on the branch, past a fork and onto a smaller branch.

Suppose though, that you wanted to go out onto a different branch entirely, past another fork, and onto a totally different small branch. The leap through space is best left to squirrels and circus performers. Instead, you retrace your route back up the branch until you get to the trunk. Then you change to the other branch and scurry down to the branch you want.

If you only wanted to get back to the trunk, you could type **cd ** and you'd be right back at the root instantly. If you want to get to a different directory branch, you have to go past the root to get there, so you type the leading backslash, followed by the path to the directory you want.

How to remove unwanted directories

The time will certainly come when you realize that an old directory is no longer much good to you, so you decide to blow it to kingdom-come. The DOS command to remove directories is RD. There are only a few simple rules to remember, such as the following.

- You can't use RD on a directory name if it still has subdirectories beneath it, or if it still contains files. You have to delete the files first, move them somewhere else, or use the DELTREE command explained later in this chapter. (Chapter 7, "How to Copy, Rename, and/or Move Your Files," and Chapter 8, "Deleting All Those Darn Copies," discuss copying, moving, and deleting files.)
- RD removes only one directory at a time.
- You can never remove the directory you're in. You have to move up at least one level closer to the root. (You wouldn't want to saw off the branch of a tree if you're still sitting on it, right?)
- You can never, *ever* remove the root directory. That one is there to stay, on all disks of every type.

Remove just one directory

Let's try removing a few directories on the sample disk. You decide that you won't be using your disk for anything except games and business applications. Therefore, the directory named PERSONAL isn't much use.

Make sure you're in the root directory by typing **cd **. Then remove PERSONAL:

rd personal

Use the TREE command, and it's gone! The PERSONAL directory should be nowhere to be found.

Q&A

I got a message that says `Invalid path, not directory, or directory not empty`. ***Now what?***

If the directory has files or subdirectories, you can't remove it with RD. You might also want to make sure that you typed the path to the directory correctly, that it really exists, and that you're not currently in it.

Now get rid of a branch that's farther down the tree

This one is just a little more difficult. You're going to remove the LOTUS directory that's beneath BUSINESS. The path to this directory is \BUSINESS\LOTUS, so you will type:

rd \business\lotus

When you use TREE, you'll see that only LOTUS disappeared. BUSINESS and its other subdirectory, WP51, are still there (see fig. 9.5).

```
A:\>rd personal

A:\>tree
Directory PATH listing
A:.
├──DOS
├──BUSINESS
│   ├──WP51
│   └──LOTUS
└──GAMES

A:\>rd \business\lotus

A:\>tree
Directory PATH listing
A:.
├──DOS
├──BUSINESS
│   └──WP51
└──GAMES

A:\>
```

Fig. 9.5
RD removes one directory at a time, even if you type a long path name.

(Tip)

By the way, because you were already in the root directory, you didn't really need to type the first slash in that last command. Some people just do it because it's a good habit. If DOS doesn't need it, the slash will be ignored.

Can't I remove an entire branch of directories?

If your system is using at least DOS 6.0, you have access to a new command called DELTREE. This one's a little scary because it will wipe out an entire directory, all its subdirectories, and any files within any of those directories. It *is* polite enough to ask if you're really sure *one time*, but you'd better check the contents of the directories first.

If you decide to wipe out the BUSINESS directory *and* the WP51 directory in one glorious explosion of data, just type:

```
deltree \business
```

DOS will ask if you want to delete BUSINESS and all its subdirectories. Type "Y" for *Yes* and press Enter (see fig. 9.6). Use TREE to see how efficient this command really is.

Fig. 9.6
DELTREE gives you one chance to change your mind, and then wipes out an entire branch of directories, including all the files. Use this command with care!

```
A:\>deltree \business
Delete directory "\business" and all its subdirectories? [yn] y
Deleting \business...

A:\>tree
Directory PATH listing
A:.
├──DOS
└──GAMES

A:\>
```

How to use DELTREE to erase an entire disk

DELTREE will allow you to type the single backslash as a parameter, which means you want to delete the root directory. You can never *really* delete the root directory, but you can delete all the files within it and all the directories on the disk. You must type a "Y" to confirm each deletion, but it works. Figure 9.7 shows how DELTREE can wipe out an entire disk.

Fig. 9.7
Typing DELTREE \ will completely wipe out a disk. Never use this on your hard disk!

```
A:\>tree
Directory PATH listing
A:.
├──DOS
├──BUSINESS
│   └──WP51
└──GAMES

A:\>deltree \business
Delete directory "\business" and all its subdirectories? [yn] y
Deleting \business...

A:\>tree
Directory PATH listing
A:.
├──DOS
└──GAMES

A:\>deltree \
Delete directory "\dos" and all its subdirectories? [yn] y
Deleting \dos...
Delete directory "\games" and all its subdirectories? [yn] y
Deleting \games...

A:\>
```

{Note}

One little typo with DELTREE, and poof!

Suppose you wanted to erase a directory named \BUSINESS, and you accidentally inserted an extra space after the backslash:

deltree \ business

Now you've done it. Remember how DOS reads commands from left to right? All it sees is DELTREE \ and starts asking if you want to erase everything on the disk! Use the Ctrl-C key combination to interrupt the command. (Pressing Ctrl and C stops any DOS operation in progress.)

How to rename a directory

Unfortunately, DOS doesn't have a command to do this at all. If you use DOS version 5 or less, the only solution is to make a new directory with the name you really want. Then you must copy all the files from the old directory to the new directory and remove the old directory. Yuck! There *must* be an easier way!

Beginning with DOS 6, there suddenly was an easier way, but it's still not a simple renaming. You have to *move* the directory from its old name to its new name. Here's an example. Suppose you have a directory on your hard disk named BUSINESS, but you'd prefer it to be called FINANCE. So do this:

```
move c:\business c:\finance
```

All of a sudden BUSINESS isn't there anymore, but FINANCE is. If there were subdirectories under BUSINESS, they're now under FINANCE as well. Cool!

10 What Happens When You Start Your Computer?

In this chapter:

- What's all that beeping and stuff on the screen when I start the PC?
- CONFIG.SYS—learn how to understand it, and even pronounce it
- What does the AUTOEXEC.BAT file do?
- How to sidestep CONFIG.SYS and AUTOEXEC.BAT
- Set up DOS to use high memory

When you turn on your computer, DOS doesn't start right away. It's like waking up in the morning—first you yawn and stretch and open your eyes before you head for the bathroom.

Before DOS can get going, your PC has to stretch a few muscles and yawn once or twice, just to make sure everything is in working order. It goes through a series of start up tests, checks things like whether or not your printer and keyboard are working, and then processes a few important files. Those of you who wear glasses know how it is—the first thing you have to do when you wake up is search around for your glasses so you can find your way to the bathroom. Your PC has to search around for a bit in order to find DOS.

{Note}

A lot of stuff in this chapter has to do with memory and how DOS uses it. If you're not familiar with how your PC's memory works, see Chapter 23 or Que's *Using Your PC*.

POST time! Boot up the old PC

This is the way the boot process goes:

1. You hit the on switch.
2. Hidden files built into the hardware inside your PC start a **power on self-test** (**POST**) to make sure everything is working correctly.
3. You hear hums, clicks, and whirrs as the fan starts and as the CPU counts the memory and checks components like the disk drives (see fig. 10.1). On your monitor, you see stuff like the name of your mouse and the amount of memory you have.

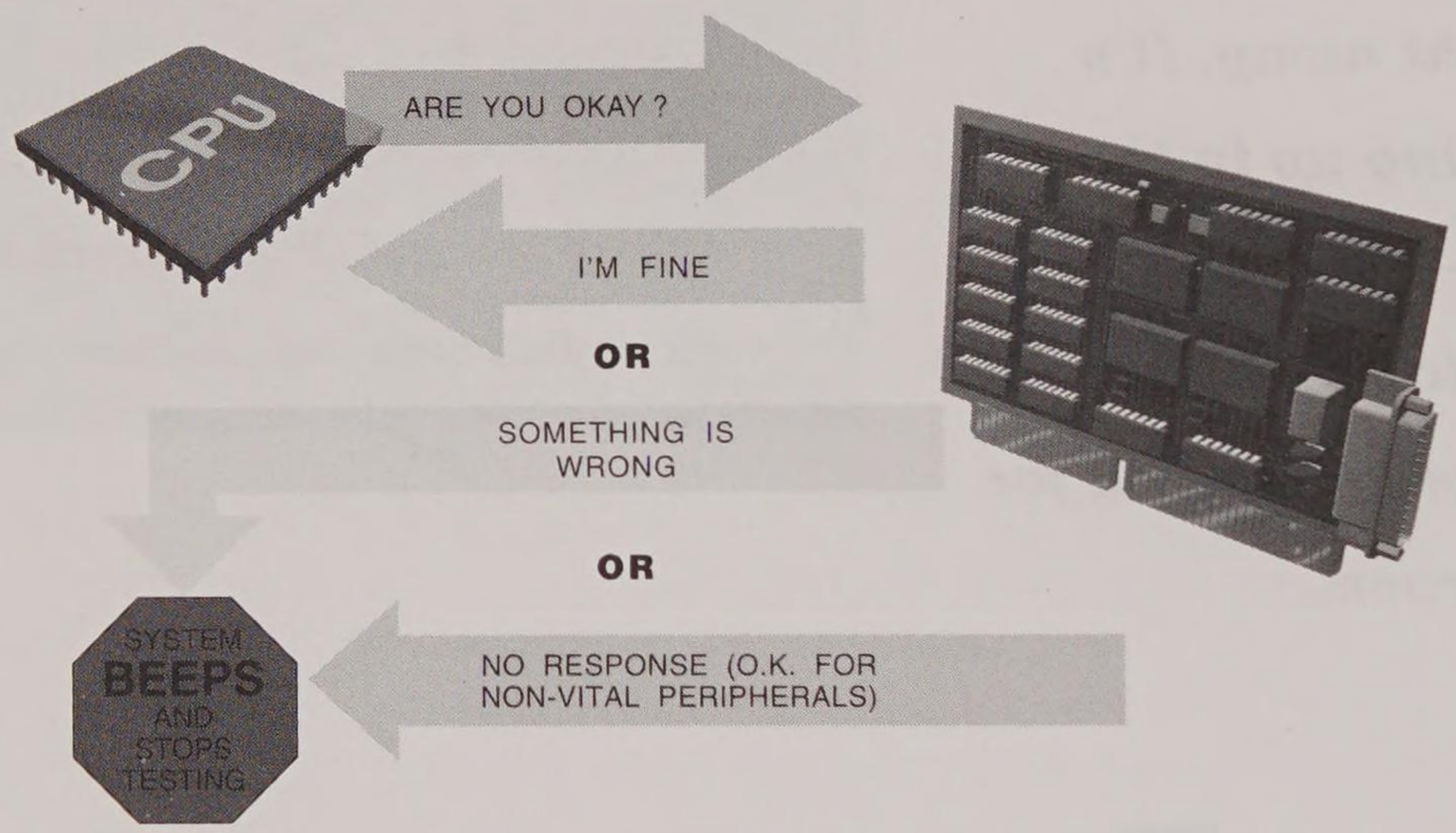


Fig. 10.1
Non-vital devices attached to your computer may not respond to the test. If the device is vital and doesn't respond, though (the keyboard, for instance), the computer will beep.

4. Assuming all systems are go, the PC is ready for DOS. This is when it starts searching around, like you might for your glasses. The floppy drive's in-use light comes on while the PC looks there for the DOS files. Do you have a floppy disk in the drive? If you do, the computer assumes that DOS is supposed to be on that disk. If that's your system's boot disk, great. If not, you'll probably get this message: `Non-system disk or disk error`. Get that disk out and press F1 to continue.
5. If you don't have a system disk in the floppy drive, the computer checks the hard disk for the DOS files, and the hard drive's in-use light comes on (see fig. 10.2).

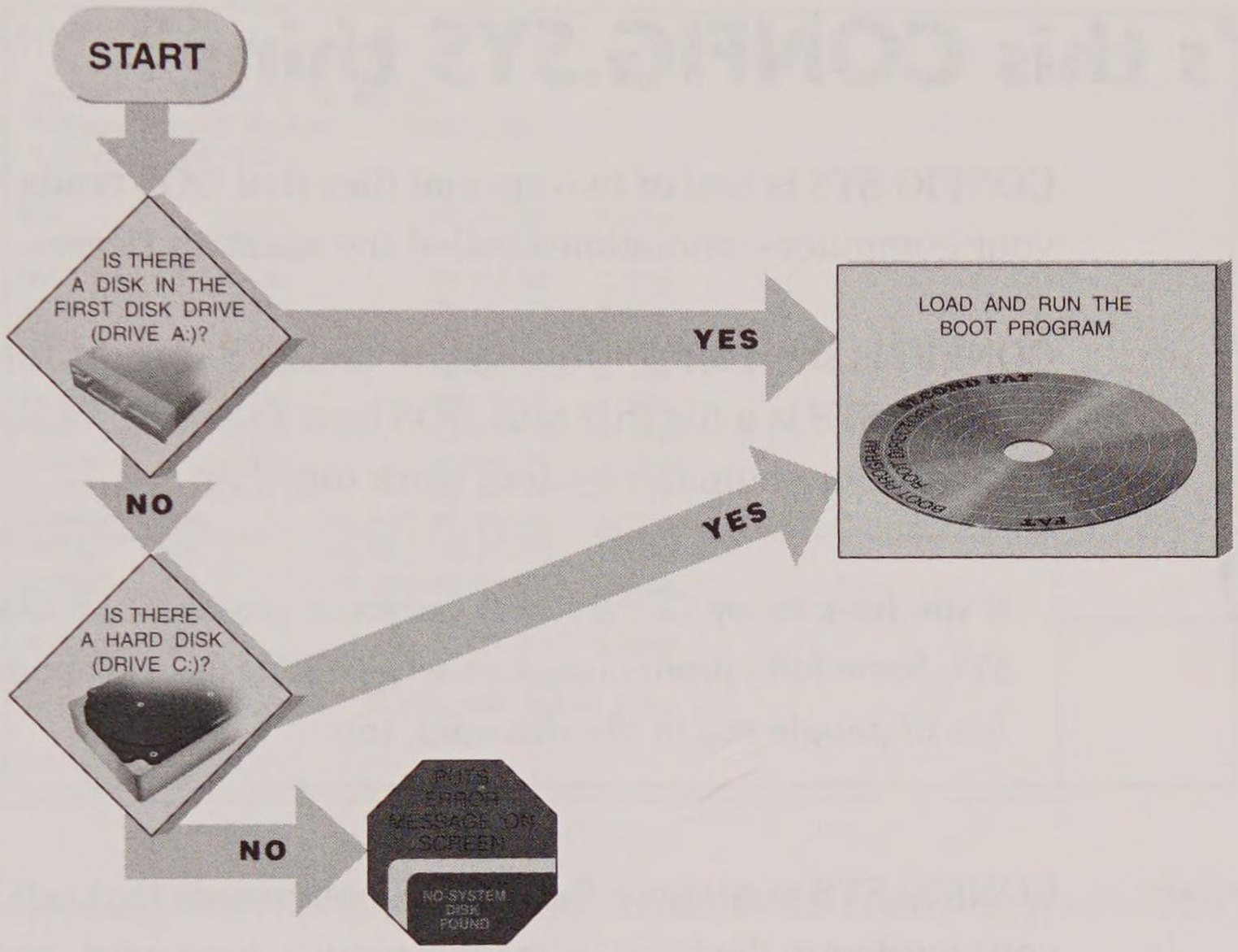


Fig. 10.2
A lot goes on between the time you flip the switch and the time you see the DOS command prompt on your screen!

6 Finally, the PC has found DOS and DOS starts loading into memory.

7 DOS checks and processes two special startup files: **CONFIG.SYS** and **AUTOEXEC.BAT**. DOS is looking for any particular instructions or commands for setting up your system that you've put in those files.

8 Okay, you're up and running. The DOS prompt appears on your screen.

(Tip)

If you want to know more about starting your PC, go back to Chapter 2, "Time to Jump in with Both Feet," and refresh your memory.

Q&A

If DOS stays in my PC's memory, and everything in memory is lost when I shut off my PC, how come DOS is still there when I turn my PC back on?

Although it may seem like it, this is not one of life's eternal questions. The answer lies in some lines of software code embedded on the hardware inside your PC. These software programs are know as "hidden files" because you're not supposed to find them. (You can if you look hard enough, but don't!) When you turn on your computer, these files are always there, and they start a sequence of events that ends with the DOS prompt appearing on your screen.

What's this CONFIG.SYS thing?

CONFIG.SYS is one of two special files that DOS reads whenever you start your computer—sometimes called the **startup files**.

CONFIG is short for *configuration*, and SYS is short for *system*. Ergo, CONFIG.SYS is a file that tells DOS how to configure itself so that all the parts of your computer system work together.

(Tip)

If you have to say CONFIG.SYS out loud, pronounce it like this: con-FIG-dot-SYS. Some folks pronounce it con-fig-SYS for short (skipping the dot part), and lots of people toss in *file* afterward, too.

CONFIG.SYS contains a list of DOS commands that tell DOS how to set up your hardware devices—like your mouse, keyboard, and printer—and how to allot memory. Whenever you start DOS, it reads the CONFIG.SYS file and then uses the information it finds to set up your system so that all of the components work together. (This isn't nearly as complicated as it sounds, though.)

CONFIG.SYS is created automatically in the root directory when you install DOS on your PC, and you may never need to change it (see fig. 10.3). But you *can* change it, and chances are that someday you will want to.

Plain English, please!

If you read the first part of this book, you remember that the **root directory** is the directory DOS makes when it formats your disk. All other directories grow out of the root (go back to Chapter 3, "Get Started with the DOS Filing System," for a refresher on directories). You also remember that a **file** is the way your organize data so you and DOS can keep track of it. Files are covered in Chapter 3, too.

Fig. 10.3
You will find your CONFIG.SYS file in your root directory.

```
C:\>dir /o:g

 Volume in drive C is DRIVEC
 Volume Serial Number is 1D6C-776C
 Directory of C:\

DOS             <DIR>          06-05-93   2:17p
WINWORD         <DIR>          01-30-94   2:48p
DATA            <DIR>          07-22-93   2:57p
UTILS           <DIR>          06-05-93   3:08p
WORD            <DIR>          06-05-93   3:09p
WINDOWS         <DIR>          06-05-93   3:18p
AMOUSE          <DIR>          03-22-94   2:52p
TEMP            <DIR>          11-12-94   1:32p
MSWORKS         <DIR>          09-08-94   1:31p
MSOFFICE        <DIR>          12-02-94  12:58p
COMMAND  COM         54,645 05-31-94   6:22a
MOUSE    SYS         34,581 10-04-90   3:09p
WINA20   386          9,349 05-31-94   6:22a
CONFIG   SYS            297 11-21-94   1:07p
AUTOEXEC BAT            263 11-21-94   1:08p
       15 file(s)         99,135 bytes
                      2,603,008 bytes free

C:\>
```

Here it is!

Here are the two most common reasons for changing your CONFIG.SYS file:

- You add a new hardware device, like a mouse, or a CD-ROM drive.
- You want to change the way memory is being used.

<Caution>

Changing your CONFIG.SYS file is risky business, because if you make a mistake, your computer may not start correctly. Luckily, most devices come with installation files that automatically make the necessary changes to the CONFIG.SYS file for you, and save backup copies of the original CONFIG.SYS file, too. DOS itself comes with a memory management program, called MemMaker, that you can use to automatically change the CONFIG.SYS file to make better use of available memory. If you are going to change your CONFIG.SYS file, or if you are going to install new devices, you should make a copy of the original onto a floppy disk. If your computer doesn't run right with the changed file, you can copy the original back into your root.

(Tip)

Make a copy of your CONFIG.SYS file and keep it in a safe place. That way if you screw up trying to make changes, you can copy the original back without anyone ever knowing.

Keep hearing about device drivers? Now you'll understand them

(Tip) This section is a little bit technical, but you can handle it.

By now, you know that every piece of hardware connected to your computer is called a **device**. The keyboard, mouse, display, printer, disk drives, and memory boards are all devices.

Every device comes with a software program called a **device driver**. A device driver acts as an interpreter between the device and DOS—when DOS needs the device to do something, it asks the driver, which in turn asks the device.

DOS finds the device driver file by looking in CONFIG.SYS for a **device command statement**. *Device command statement* is just a fancy way of saying "command line." The device command statement is the command line that tells DOS where to look for the device driver file.

Most devices come with installation programs that automatically change your CONFIG.SYS file. If you get a new mouse, just read the instruction manual and follow the directions. It probably involves inserting a disk and typing **install**. If the device doesn't have an installation program, you may have to add a command statement to your CONFIG.SYS file yourself. You'll learn how to edit the CONFIG.SYS file in Chapter 11, "How to Edit Startup Files with the MS-DOS Editor (and Without It);" the software program's documentation should indicate what they want you to add.

How the command lines in CONFIG.SYS work

In a CONFIG.SYS file, every command statement starts on a new line. That way, DOS won't get confused.

To see your CONFIG.SYS file, enter the command **type config.sys** at the DOS prompt (see fig. 10.4).

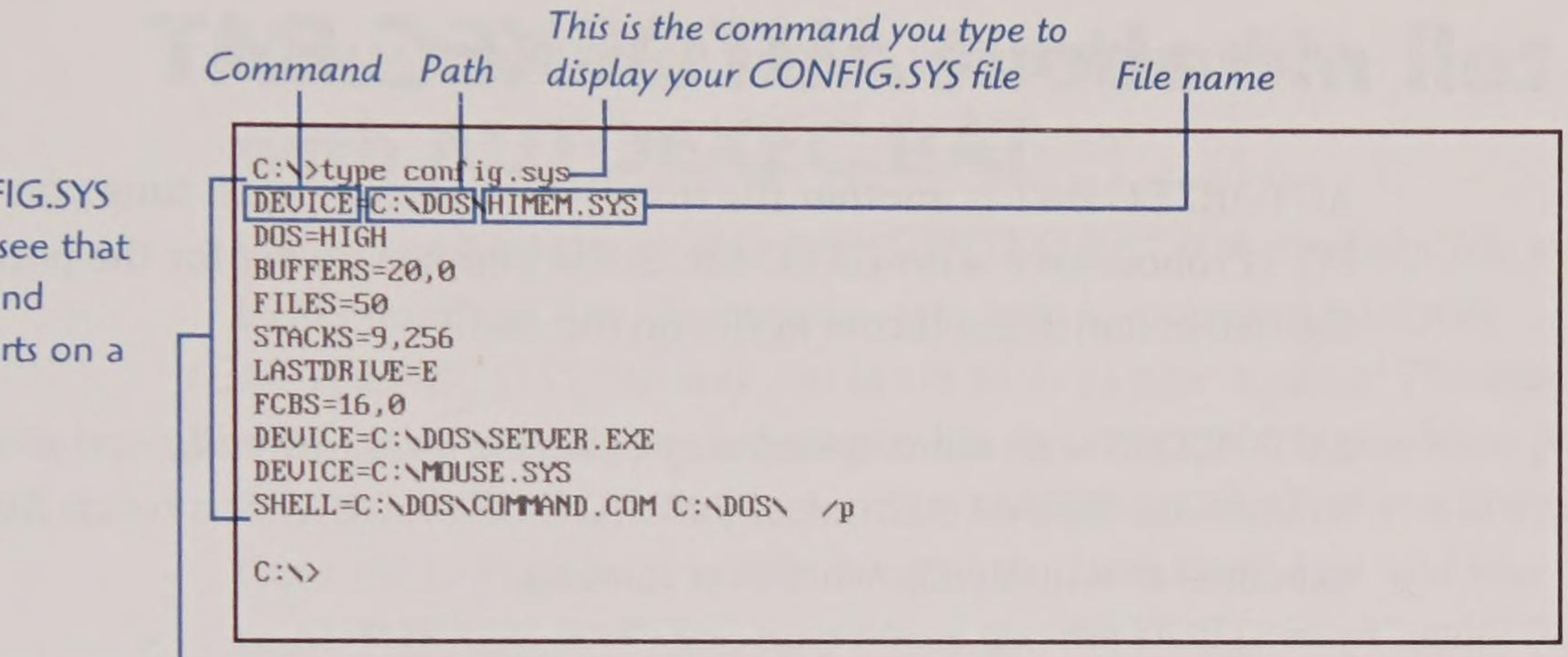


Fig. 10.4
In this CONFIG.SYS file, you can see that every command statement starts on a new line.

A CONFIG.SYS command statement includes a DOS command, usually a path, and a file name—almost like you would type on a command line at the DOS prompt. The commands you use in CONFIG.SYS, however, do not work from the DOS prompt. (If you need a refresher on typing commands at the DOS prompt, go back to Chapter 4, "More Drive and Directory Stuff," and Chapter 5, "How to Examine the Files on Your Disk.")

The following table lists some commands you're likely to find in your CONFIG.SYS file. In Chapter 11, "How to Edit Startup Files with the MS-DOS Editor (and Without It)," you'll learn more about how to use them.

Command	What it's used for
DEVICE	Tells DOS where to find a certain device driver
DEVICEHIGH	Tells DOS to load a device driver into the upper memory area
FILES	Tells DOS the maximum number of files that can be open at one time
BUFFERS	Tells DOS how much memory to reserve for transferring stuff to and from disk drives
BREAK	Specifies how often DOS checks for whether you've pressed Ctrl-C or Ctrl-Break to cancel commands
LASTDRIVE	Reserves memory for logical drives

Now tell me about AUTOEXEC.BAT

AUTOEXEC.BAT is another file that DOS processes each time you start your PC. (Pronounce it auto-EXEC-bat. Some people add *dot* for the period in the file name, and some throw in *file* on the end.)

AUTOEXEC is an abbreviated way of saying *automatically executed* (you would have figured that out, right?). AUTOEXEC.BAT is a batch file that DOS executes automatically whenever it starts.

> ***Plain English, please!***
>
> **BAT** is the file name extension used for **batch files**, or files made up of a whole batch of commands. (Skip to Chapter 25, "Cool DOS Tools: DOS Shell, Help, and Batch Files," if you need to know more about batch files.)

AUTOEXEC.BAT shares some similar traits with CONFIG.SYS. Both are created in the root directory when you install DOS on your PC (take another gander at figure 10.3; it's in the same list with CONFIG.SYS). Both contain lists of DOS commands. DOS reads both each time you start your computer. You can make changes to both at any time, and if you make mistakes making changes, your PC may never work the same again.

{Note} If you don't have an AUTOEXEC.BAT file, someone (not you, of course) probably deleted it. In Chapter 11, you'll learn how to make a new one.

One major difference between AUTOEXEC.BAT and CONFIG.SYS, however, is that DOS saves you the trouble of entering the commands in AUTOEXEC.BAT at the command line. You can put any DOS command you want in the AUTOEXEC.BAT, and DOS will execute it every time you start your computer. Yes, that's *any* DOS command. You'll learn how in Chapter 11, "How to Edit Startup Files with the MS-DOS Editor (and Without It)."

How to save time and trouble with AUTOEXEC.BAT

One of the best things about AUTOEXEC.BAT is it can help you avoid the DOS command line. Just think—you type a command into your AUTOEXEC.BAT file and you never have to type it again! For example, if you start every session by changing to the directory where you keep your data files, you can add a **cd** command to AUTOEXEC.BAT. If you always go right from the DOS prompt to Windows or the DOS Shell, just add **win** or **dosshell** to AUTOEXEC.BAT. You may never use the DOS prompt again! (Okay, that's an exaggeration.)

Of course, there are other reasons for adding commands to your AUTOEXEC.BAT file. Some AUTOEXEC.BAT commands, like PATH, can save you time; and some, like PROMPT, can customize your screen display. To see your AUTOEXEC.BAT file, enter the command **type autoexec.bat** at the DOS prompt (see fig. 10.5).

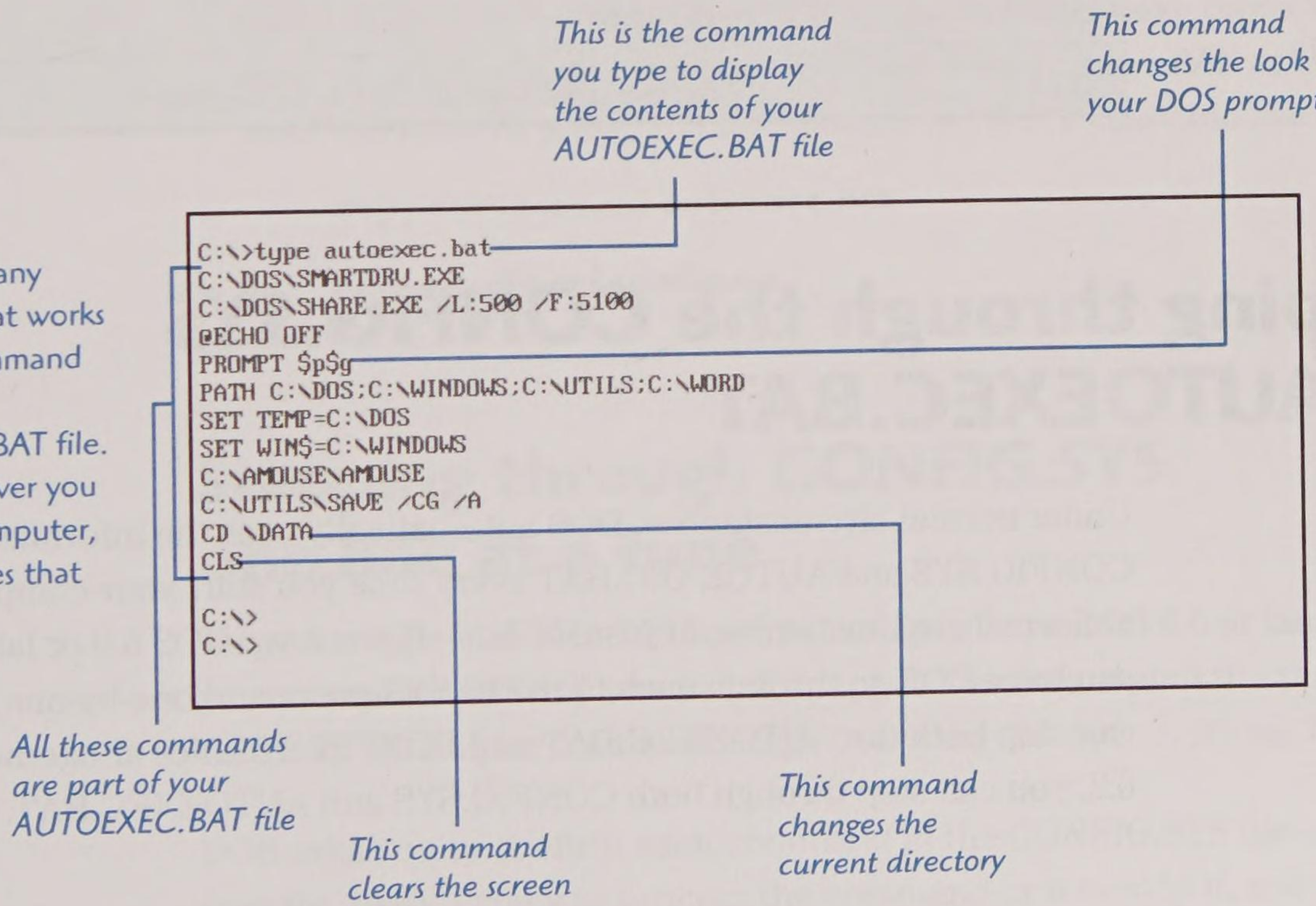


Fig. 10.5
You can put any command that works from the command line in the AUTOEXEC.BAT file. Then, whenever you start your computer, DOS processes that command.

This table lists some of the commands you might want to include in your AUTOEXEC.BAT file. You'll learn how to do this in Chapter 11, "How to Edit Startup Files with the MS-DOS Editor (and Without It)."

Command	What it's used for
PROMPT	Customizes the appearance of the DOS prompt
PATH	Tells DOS what directories to look in when trying to locate program files or commands. If the directory you need is included in the **path statement**, you don't have to tell DOS where the file is—DOS will look in all the directories named in the path
SET TEMP	Tells DOS where to store temporary files
CD	Changes to the directory you want to work in
LH (LOADHIGH)	Loads a program into high memory
WIN	Starts Windows
DOSSHELL	Starts the DOS Shell
CLS	Clears the screen except for the DOS prompt

Stepping through the CONFIG.SYS and AUTOEXEC.BAT

Under normal circumstances, DOS automatically uses the information in CONFIG.SYS and AUTOEXEC.BAT every time you start your computer. In abnormal circumstances, or just for fun—if you have DOS 6.0 or later—you can have DOS go through each CONFIG.SYS command one-by-one, or you can skip both the AUTOEXEC.BAT and CONFIG.SYS files altogether. In DOS 6.2, you can step through both CONFIG.SYS and AUTOEXEC.BAT.

These are some abnormal circumstances when you might want to step through CONFIG.SYS commands:

- Your PC is working strangely and you can't figure out why
- You changed your AUTOEXEC.BAT or CONFIG.SYS file and now DOS doesn't load correctly
- A lot of garbage is appearing on your screen during startup and you want to find out what it is

If you go through the CONFIG.SYS file line-by-line, you might be able to discover which command statement is causing problems during startup. Then, you could fix it.

Q&A

I can't figure out what's wrong with this crazy file!

If you can't discover the problem, or if you can't fix the problem, you can skip the startup files completely, then copy your original AUTOEXEC.BAT and CONFIG.SYS files back into the root directory. (You did make copies like you were supposed to, didn't you?) If you copied these files to a BAK or SAF or other extension for safety, you can restore them with a command like this:

```
copy autoexec.saf autoexec.bat
copy config.saf config.sys
```

Stepping through CONFIG.SYS one line at a time

To go through CONFIG.SYS line-by-line if you have DOS 6.0 or later, just start your computer the way you usually do, but this time, watch the screen carefully. When you see the message `Starting MS DOS...`, press F8.

DOS asks you to confirm each command in the CONFIG.SYS file one-by-one (see fig. 10.6). Type **y** to process the command or **n** to skip it, and watch the screen for error messages.

```
256 KB CACHE MEMORY
Starting MS-DOS...

MS-DOS will prompt you to confirm each CONFIG.STS command.
DOS=HIGH [Y,N]?Y
DEVICE=C:\DOS\HIMEM.SYS [Y,N]?Y
BUFFERS=20,0 [Y,N]?Y
FILES=50 [Y,N]?Y
STACKS=9,256 [Y,N]?Y
FCBS=16,0 [Y,N]?Y
DEVICE=C:\DOS\SETVER.EXE [Y,N]?Y
DEVICE=C:\MOUSE.SYS [Y,N]?Y
Microsoft (R) Mouse Driver Version 7.05
Copyright (C) Microsoft Corp. 1983-1990.  All rights reserved.
Mouse driver installed
SHELL=C:\DOS\COMMAND.COM C:\DOS\  /P [Y,N]?Y
LASTDRIVE=E [Y,N]?Y
Process AUTOEXEC.BAT [Y,N]?
```

Fig. 10.6
By stepping though each CONFIG.SYS command statement, you may be able to find the cause of start-up problems.

At the end of the CONFIG.SYS file, DOS asks if you want to process the AUTOEXEC.BAT file. Type **y** or **n**. DOS will then either process AUTOEXEC.BAT, or step through it the way it stepped through CONFIG.SYS.

Skipping both startup files

To skip both AUTOEXEC.BAT and CONFIG.SYS, press F5 when the `Starting MS DOS...` message appears. The DOS prompt appears immediately.

(Tip)

Don't be surprised at the way your system runs if you skip all or part of the CONFIG.SYS and AUTOEXEC.BAT files. You'll be running a sort of generic DOS, not the customized DOS you are used to. You might not actually be able to do anything at all, because you may not be able to access your disk drives, your mouse, and other vital devices.

Q&A

I've got a startup problem but it's in AUTOEXEC.BAT, not CONFIG.SYS. How can I find it?

Pressing F8 steps you through CONFIG.SYS, but AUTOEXEC.BAT still goes by pretty fast. Luckily, AUTOEXEC.BAT usually leaves messages on your screen as it processes each command. For example, you might see a `Bad command or file name` message. If you are having trouble, make sure you don't end your AUTOEXEC.BAT file with a CLS command. That way, the messages will remain on your screen, right above the DOS prompt. You can also edit your AUTOEXEC.BAT file to add a pause command right after the line that gives the error message. That way, the message will stay on your screen until you press any key. See Chapter 11 to find out how to edit the file.

In the most recent versions of DOS (6.2 and later), DOS steps through AUTOEXEC.BAT, too.

Loading stuff high

Sorry, but loading stuff high means making use of all available memory, not popping a couple of little yellow pills and then trying to install new software.

Briefly, if you have more then 640K bytes of memory in your computer, you can use high memory. High memory is good, because while DOS is running applications and processing data files in conventional memory, DOS and device drivers that aren't being used can hang out in high memory, instead of wasting conventional memory. All of this makes your computer faster and more efficient. (If you forget everything you ever learned about memory, check out Chapter 23, "Make the Most of Your Memory with MemMaker.")

DOS automatically adds these two commands to CONFIG.SYS if you have extended memory:

- DEVICE=C:\DOS\HIMEM.SYS
  HIMEM.SYS is the DOS extended memory manager.
- DOS=HIGH
  DOS=HIGH is a command that tells DOS to load itself into extended memory.

With these two commands in CONFIG.SYS, you can load other drivers and memory-resident programs, sometimes called **terminate-and-stay-resident programs** (**TSR**s), into high memory. (TSRs are explained in a minute. Stay tuned.)

How to load device drivers high

You can load device drivers into high memory by changing the DEVICE command to DEVICEHIGH in your CONFIG.SYS file. For example, to load a mouse driver into high memory, you might change this command:

```
DEVICE=\UTILS\MOUSE.SYS
```

to this (see fig. 10.7):

```
DEVICEHIGH=\UTILS\MOUSE.SYS
```

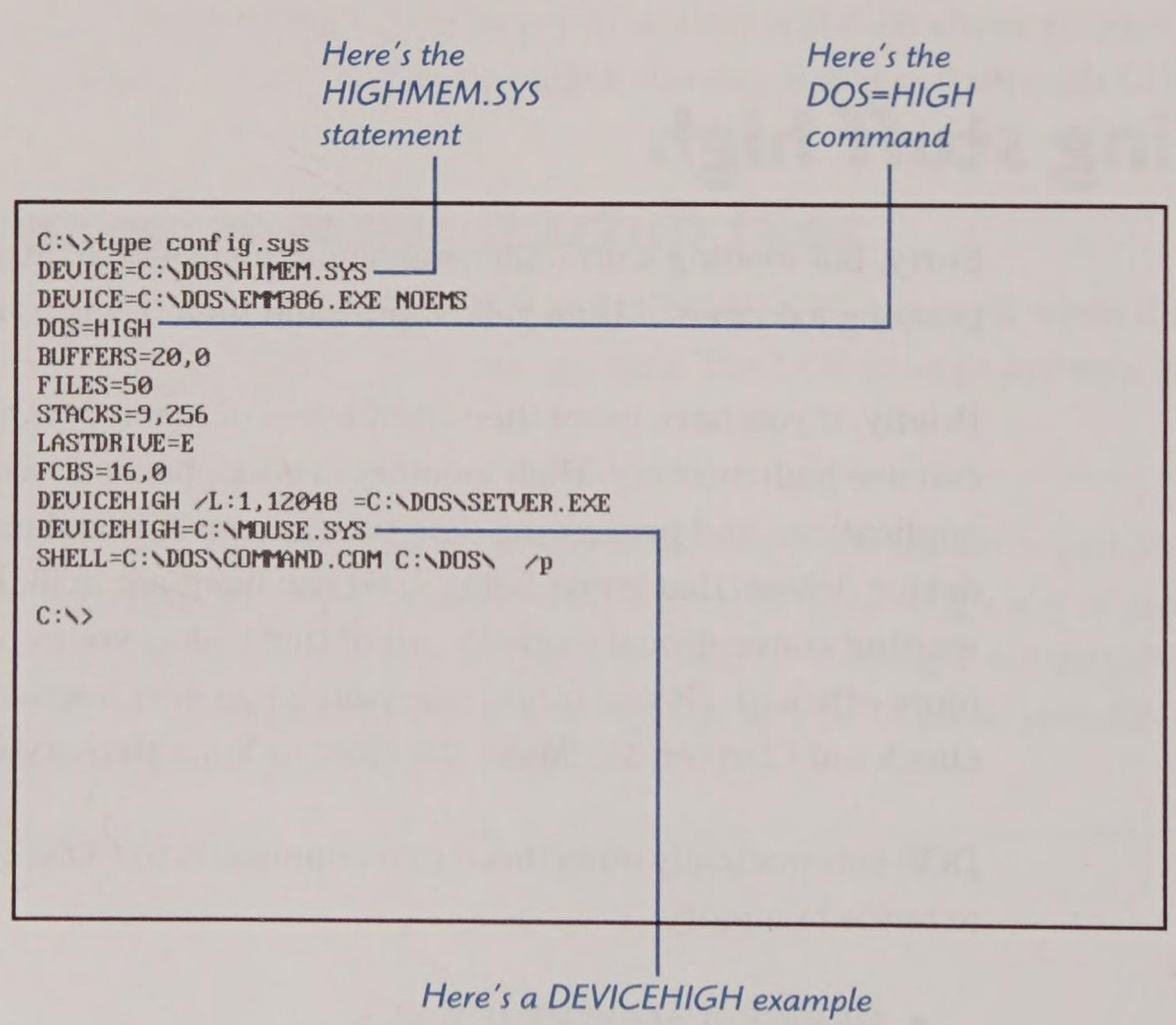


Fig. 10.7
To load a device driver into high memory, you change the DEVICE command to DEVICEHIGH.

How to load TSRs and other programs high

You can load TSRs and other programs into high memory by using an LH (LOADHIGH) command statement in AUTOEXEC.BAT. For example, to load the DOSSHELL into high memory, switch `DOSSHELL` to `LH DOSSHELL` in the AUTOEXEC.BAT file (see fig. 10.8).

<Caution> If you are going to load devices into high memory, make sure you put them after the HIMEM device command statement in the CONFIG.SYS file. The HIMEM command statement must come first.

Fig. 10.8
To load a TSR or memory-resident program into high memory, you add LH (LOADHIGH) to the beginning of the command line.

```
C:\>type autoexec.bat
C:\DOS\SMARTDRV.EXE
C:\DOS\SHARE.EXE /L:500 /F:5100
@ECHO OFF
PROMPT $p$g
PATH C:\DOS;C:\WINDOWS;C:\UTILS;C:\WORD
SET TEMP=C:\DOS
SET WIN$=C:\WINDOWS
C:\AMOUSE\AMOUSE
C:\UTILS\SAVE /CG /A
LH DOSSHELL

C:\>
```

An easy way to load into high memory

What are TSRs and why should I load them high?

TSRs are programs that you use for a short amount of time, then put aside for a while until you need them again. Usually, TSRs are utility programs as opposed to application programs. The DOS Shell is a TSR, as are screen capture programs, anti-virus software, and delete protection programs.

The whole point of TSRs is that they are waiting there ready for you when you need them. If they wait around in conventional memory, you have less memory available for running other programs. DOS has to swap more data to disk which slows things down considerably. If you load a TSR into high memory, DOS can get at it quickly when you need it, and conventional memory is still available for more immediate tasks.

MemMaker does the dirty work

Managing memory can be one of the most confusing parts of keeping your PC under control. Before you can load drivers and programs into high memory, you have to set up DOS to support high memory. This can be a complicated process of adding various DEVICE statements to your CONFIG.SYS file, and deciding which programs you should load high. Or it can be a simple matter of using MemMaker.

MemMaker is a **memory optimization program** that comes with DOS 6.x. MemMaker automatically makes changes to your CONFIG.SYS and AUTOEXEC.BAT files so you can get the most out of your system's memory.

First, MemMaker analyzes your CONFIG.SYS and AUTOEXEC.BAT files. Next, it analyzes your system memory. Then, it makes the necessary changes. You just sit back and relax as MemMaker decides what's best for you (see the figure).

```
Microsoft MemMaker

MemMaker has finished optimizing your system's memory. The following
table summarizes the memory use (in bytes) on your system:

                                Before          After
Memory Type                     MemMaker        MemMaker        Change
-------------------------------------------------------------------------
Free conventional memory:       478,240         586,448         108,208

Upper memory:
   Used by programs                   0         108,208         108,208
   Reserved for Windows               0               0               0
   Reserved for EMS                   0               0               0
   Free                         158,816          50,576

Expanded memory:                Disabled        Disabled

Your original CONFIG.SYS and AUTOEXEC.BAT files have been saved
as CONFIG.UMB and AUTOEXEC.UMB.  If MemMaker changed your Windows
SYSTEM.INI file, the original file was saved as SYSTEM.UMB.

ENTER=Exit  ESC=Undo changes
```

Want more memory to be available? Check out the difference MemMaker can make!

You do have to do some of the work, of course. You have to make sure your CONFIG.SYS and AUTOEXEC.BAT files don't contain any unnecessary commands. You have to make sure they *do* contain all necessary commands. And it helps if you at least understand the different kinds of memory you have available. But, even if you don't, MemMaker can help. For the complete low-down on MemMaker, flip to Chapter 23, "Make the Most of Your Memory with MemMaker."

11 How to Edit Startup Files with the MS-DOS Editor (and Without It)

Ready to change your startup files? This chapter shows you what to change and how to do it—safely and with a minimum of fuss.

In this chapter:

- Why would you want to change your startup files, anyway?
- Safety first: Back up the files before you fool around with them
- It's easy to edit files with the MS-DOS Editor
- Alternatives to using Editor

After reading Chapter 10, "What Happens When You Start Your Computer?" you know that two startup files—CONFIG.SYS and AUTOEXEC.BAT—control the steps DOS goes through automatically when you turn on the computer. Recent versions of MS-DOS include a handy text editor that works great for editing those startup files. (If you don't have the MS-DOS Editor, you can still modify the files; see the end of this chapter for ideas on how to do it.)

This chapter is a "two-fer;" you get to explore how to use the Editor at the same time you learn how to modify your AUTOEXEC.BAT file. To keep it short, we won't fool with CONFIG.SYS, but you can change it pretty much the same way as AUTOEXEC.BAT.

{Note}

For the Editor to run, the QBASIC.EXE file must be available on your system. If you (or whoever configured your computer) didn't think you were going to run BASIC programs and removed QBASIC.EXE to save disk space, you won't be able to run the Editor.

Changes you might want to make in your startup files

So why would you want to mess around with your computer's startup files to begin with?

Well, there are several reasons. The most common is that you've installed some new hardware or software that needs to load a device driver or adjust some configuration settings in order to run properly. Fortunately, most hardware and software installation programs will take care of this chore automatically.

In addition to installing device drivers and such in your startup files, you may want to try making some changes to customize your system and tweak it a bit. Here's a quick look at some common changes you might consider.

CONFIG.SYS changes

- Changing the BUFFERS setting

  The default setting is usually 15, but Windows and many other programs will run better if you increase this to around 40. However, if you use SMARTDRV or another disk cache, you can reduce the setting to 10 and let the cache take care of buffering disk activity.

- Increasing the number of FILES

  The default value for the FILES setting is a paltry 8. Many programs will require a larger value in order to open more files. For instance, Windows needs about 60; and some database programs may need more than 100. The limit is 255.

- What does this BREAK command do?

  Including the BREAK=ON line in your CONFIG.SYS file makes it easier for you to force the computer to abort an operation by pressing Ctrl-C or Ctrl-Break. Programmers tend to do this a lot, and the person who set up your computer might have included the command in your CONFIG.SYS file out of habit. You're not likely to need it, so forget about it.

- Don't fool around with LASTDRIVE if you're on a network

  You use the LASTDRIVE command to tell DOS how many drives you plan to access. Since DOS doesn't need any help counting the physical drives on your computer, this command isn't usually necessary unless you're going to be accessing network drives or creating virtual drives. Dealing with drive assignments for a network can get confusing, so check with your network administrator before changing the LASTDRIVE setting.

AUTOEXEC.BAT changes

- Doctoring your PROMPT command

  The default DOS prompt is pretty plain—just a drive letter followed by the greater than sign. You can make DOS include more information in the prompt by changing the PROMPT command. You'll have to use some special codes to get the effect you want.

- Changing the PATH

  Adding a new application's directory to the path statement is probably the most common editing change you'll make to your AUTOEXEC.BAT file. And of course, you need to make sure that your DOS directory is listed as well.

- Setting the TEMP directory

  Lots of programs need to create temporary files. You can use the SET TEMP command to tell DOS (and those other programs) where to put them. The best tactic is to create a special directory just for temporary files and then use this setting to tell DOS which directory it is.

Ready to try it? Wait! Back up the originals just in case

Remember, the startup files are vital to your computer system. If they're missing or contain errors, your computer simply won't act the same. Sounds pretty scary, huh? But you *can* make changes to your startup files in relative safety. Just make backup copies of the startup files before you change them.

<Caution> Always, *always*, back up the startup files before making any changes. That way, if there's a problem with any of your changes, you can always recover by going back to the old version of the file.

Making the backup files is easy. Just use the COPY command to make a copy of each startup file and give the copy a new name or extension, like so:

```
copy autoexec.bat autoexec.saf

copy config.sys config.saf
```

These commands make backup copies of the files in the same drive and directory as the originals. If you're really cautious, you can make an extra copy of each startup file on a floppy diskette as well.

<Caution> In extreme cases, editing the startup files might mess them up so bad that your computer won't even boot up properly. If that happens, backup copies of the startup files on your hard disk won't do you any good.

The solution is to always have a bootable floppy disk available—complete with functioning copies of the startup files. If all else fails, you can always boot your computer with the floppy disk. Then you can replace the startup files on your hard disk with the backup versions and reboot.

{Note} I like to use the SAF extension for my "safety net" backups. It distinguishes those copies from backups that some programs create automatically. You can use any extension or file name you like. Extensions such as BAK and OLD are popular.

Now start the Editor and open the file

The MS-DOS Editor is included with MS-DOS version 5.0 and above. (It uses the command EDIT to run, and so is frequently just called EDIT.) It was installed in your DOS directory along with the rest of DOS. Since your DOS directory is usually included in the PATH statement, DOS should be able to find and execute the Editor program no matter what directory you're in when you issue the EDIT command.

As you'll see, Editor is a simple, but capable, text editor with easy-to-use menus. If you have a mouse, you can use it to make menu selections, move the cursor, and highlight text.

To begin editing the startup files, change to the root directory of your boot drive where the startup files are located. Then follow these steps:

1. At the DOS prompt, type **edit**, and press Enter to start the Editor. The opening screen is displayed, as shown in figure 11.1.

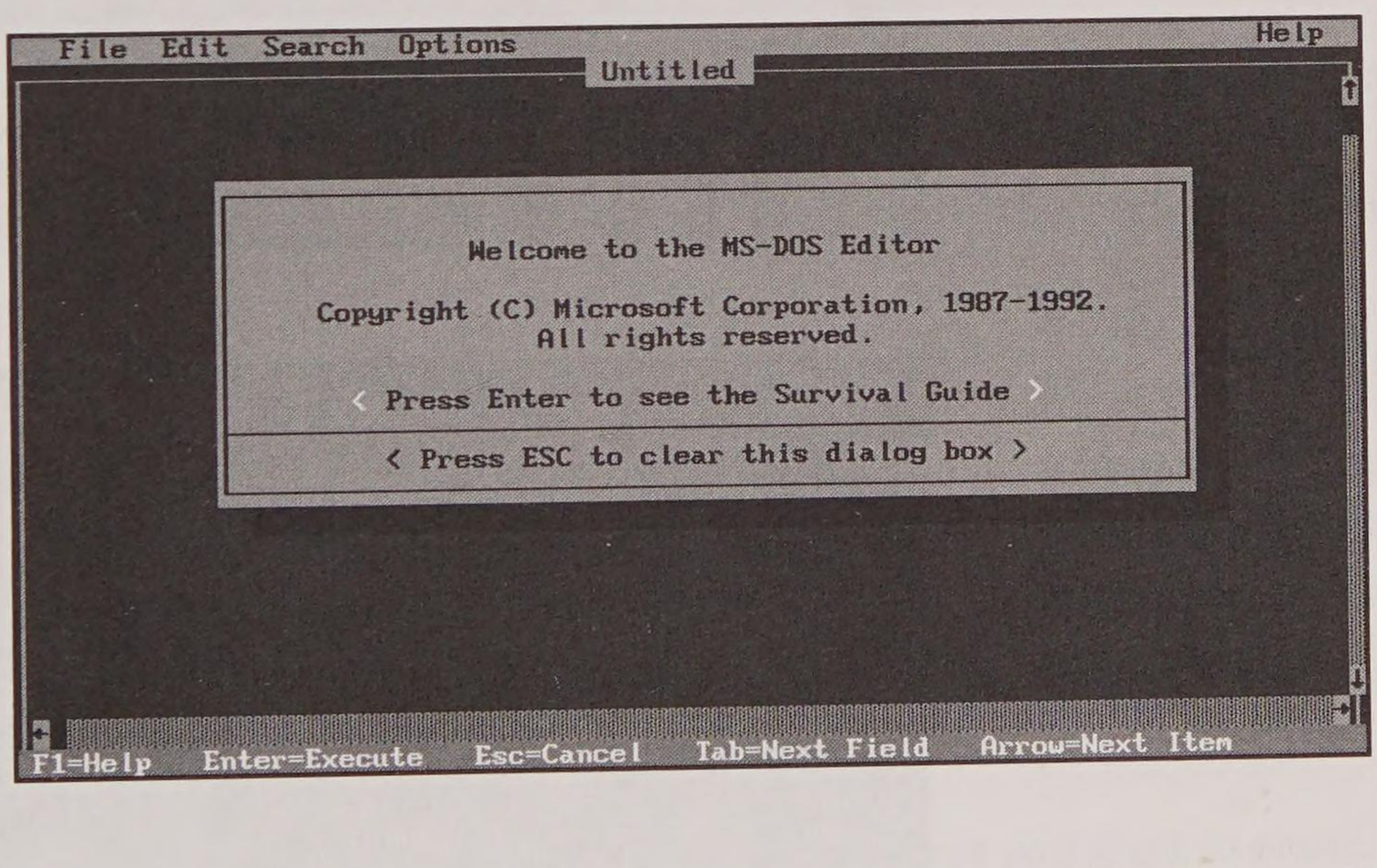


Fig. 11.1
When you run MS-DOS Editor, the program offers to display a help screen called the Survival Guide.

2. Press Esc to get rid of the Survival Guide offer. (At some later point, you might want to press Enter at the opening screen and browse around in the Survival Guide.)

3. Open the file menu by pressing Alt-F or clicking File with your mouse. Then choose the Open command by clicking the command with your

mouse, by moving the highlight over the command with the arrow keys and pressing Enter, or by pressing the highlighted letter—in this case, O.

The Open dialog box will appear.

4 To specify what file you want to work on, type the file name in the File Name box, as was done in figure 11.2. (The cursor is already waiting there; just start typing.) In this case, type **autoexec.bat** and press Enter. The Editor will open the file in its main window, ready for you to edit (see fig. 11.3).

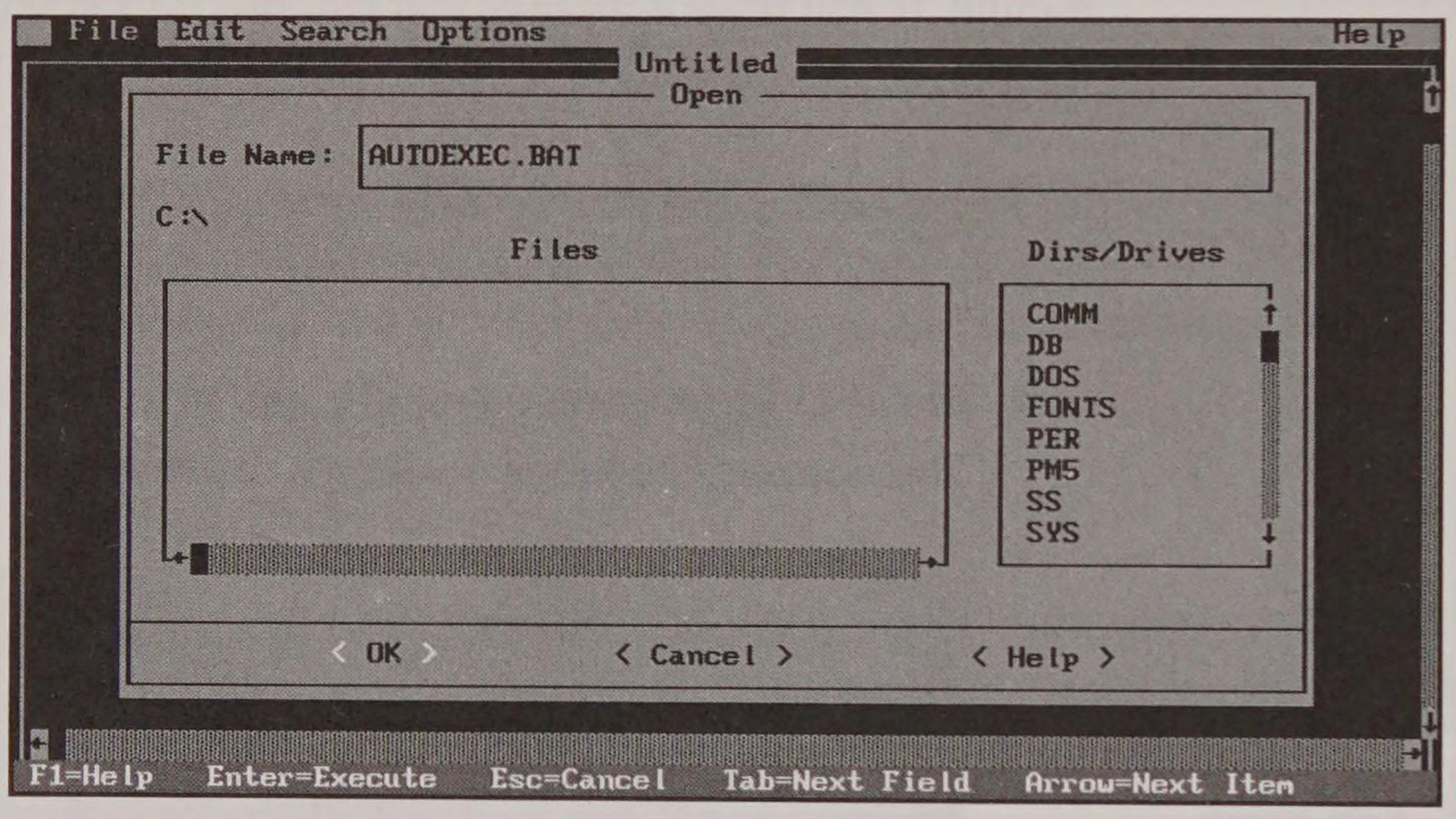


Fig. 11.2
The Open dialog box lets you type the name of the file you want to edit, or browse around your disk, looking for the file.

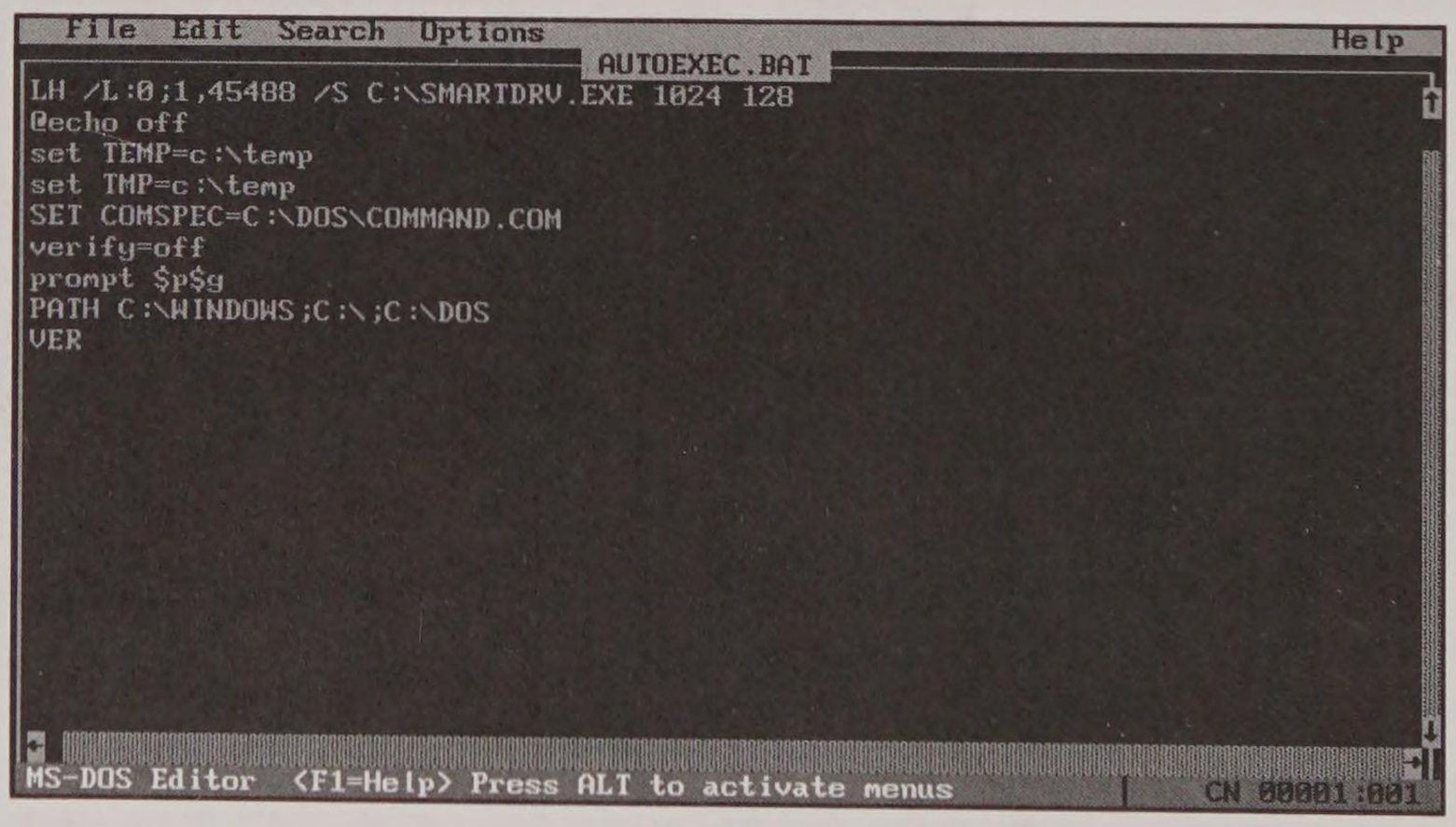


Fig. 11.3
Here's a sample AUTOEXEC.BAT file awaiting surgery in Editor.

{Note}

At first, the Files box contains only files with TXT extensions because the File Name box contains *.TXT. If you want to see a list of all the files in the highlighted directory, type ***.*** in the File Name box and press Enter.

(Tip)

If you have a mouse, browse through the Files and Dirs/Drives boxes to select a file. It works like the dialog boxes in Windows. You can use these boxes without a mouse, but it's easier and faster to just type the path and file name.

(Tip)

You can skip the Open dialog box and load a file automatically when you start the MS-DOS Editor. Just add the file name after the EDIT command, like so.

```
edit autoexec.bat
```

Basic editing

In Editor, you can move the cursor around in the file by pressing the arrow keys or by clicking with the mouse where you want the cursor to move. The Home and End keys are handy to move the cursor to the beginning or end of a line.

If you want to insert text, just move the cursor to where you want to insert the text, and start typing. By default, Editor starts out in Insert mode. Text you type will be inserted into the file at the cursor position, and any existing text will get pushed downstream to make room. You can press the Insert key to toggle Editor into Overwrite mode, where the new text you type will replace any existing text at that position in the file.

To erase unwanted text, move the cursor to the text you want to erase and press the Delete or Backspace keys. The Delete key erases the character the cursor is on and the Backspace key erases the character preceding the cursor.

As an example, let's edit our sample AUTOEXEC.BAT file to add a directory to the PATH statement and delete the VER command on the last line. Here are the steps to follow.

1. Move the cursor to the line that starts with the word PATH.
2. Press End to move the cursor to the end of the line.
3. Type **;c:\mydir** to add the directory to the PATH statement.
4. Move the cursor down to the last line and press Home.
5. Press Delete three times to delete the VER command.

That's all there is to it. Figure 11.4 shows the result.

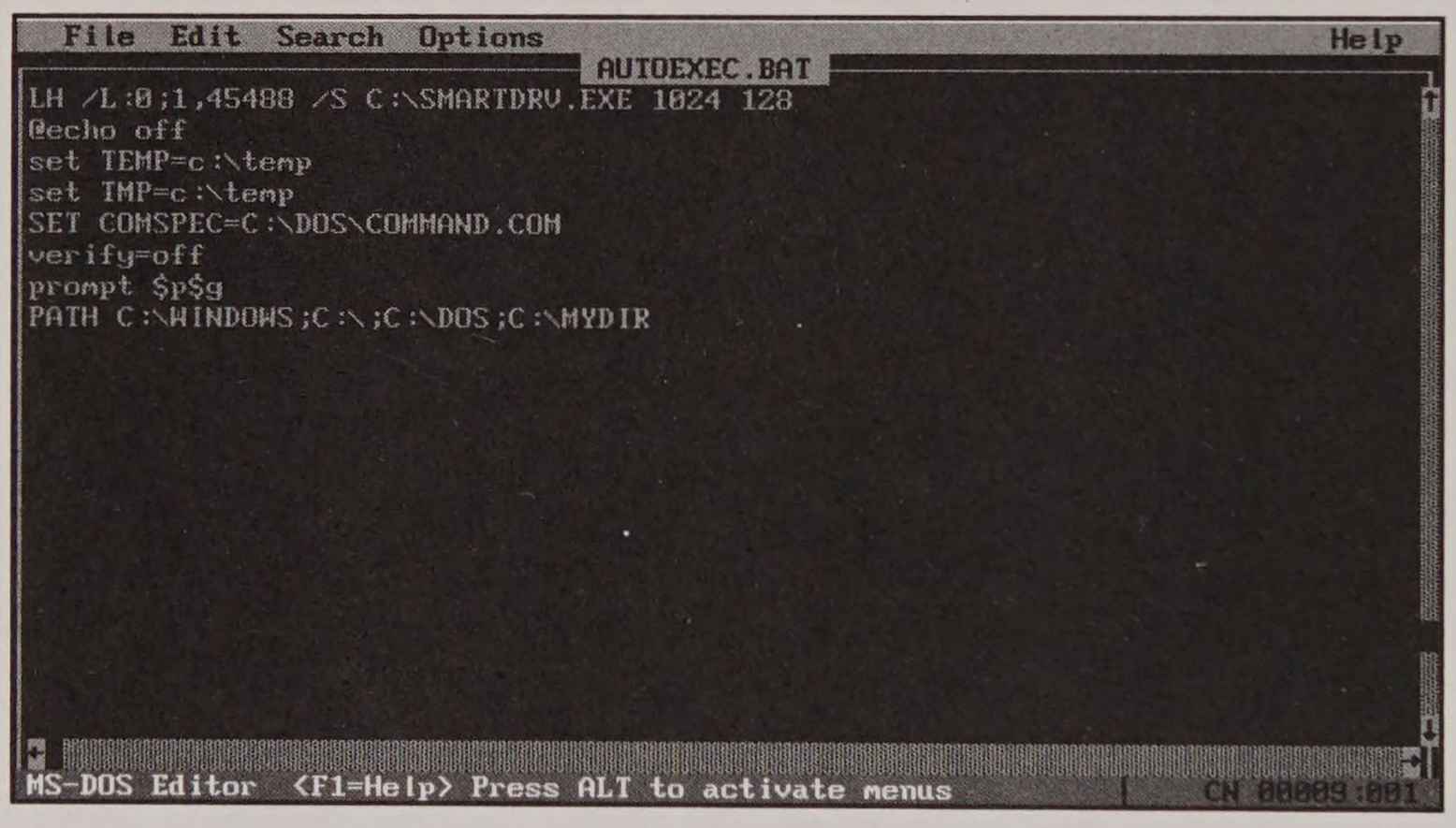


Fig. 11.4
You can add text by simply typing, or erase text with the Delete and Backspace keys.

For more elaborate stuff, use the Edit menu

Sometimes you'd rather manipulate blocks of text in the file instead of just typing or deleting individual characters. You just highlight a block of text and then do something to it by selecting a command from the menu. To highlight text, click at the beginning and drag the mouse to the end of the stuff you want to edit, or hold down the Shift key while moving the cursor with the arrow keys. That works for selecting text within a line. If you want to select whole lines of text, hold down the Shift key, and press the down-arrow key (see fig. 11.5).

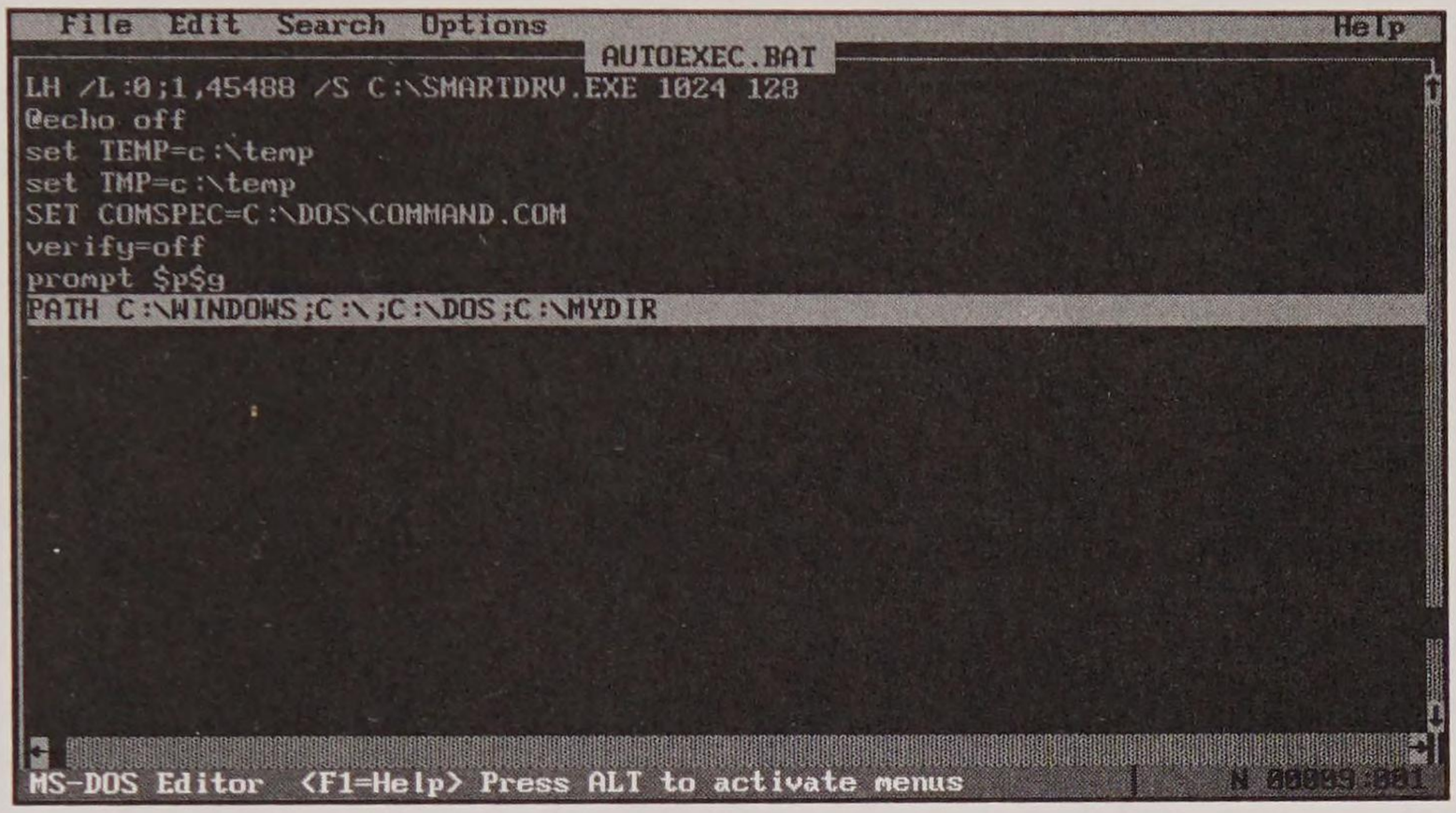


Fig. 11.5
To manipulate a whole line of text, be sure to highlight the entire !ine, including the invisible return character lurking at the end.

To open the Edit menu, press Alt-E. Then, you can choose one of the edit commands or use the shortcut keys noted on the Edit menu (see fig. 11.6):

- Cut or Copy

  The Cut and Copy commands both store a copy of the highlighted text on an invisible "Clipboard" for possible future use. Cut deletes the original text after making the copy, while Copy does just as the name implies; it makes a copy and leaves the original in place.

- Paste

  To get text back off the Clipboard and into your file, use the Paste command. It'll insert at the cursor position a copy of the text stored on the Clipboard.

- Clear

  The Clear command is the trash can; it'll clear the highlighted text out of the file. Contrary to what you might guess, the Cut command cuts the text but *also* saves it to the Clipboard. The Clear command is the one to use if you want the text to just go away. Who knows why the programmers didn't call the command Delete or Erase instead of Clear?

You may have noticed that the Edit menu doesn't include a command for moving stuff. Moving text is a two-step process. First you cut the text and store it on the Clipboard. Then you paste it back into the file at its new location.

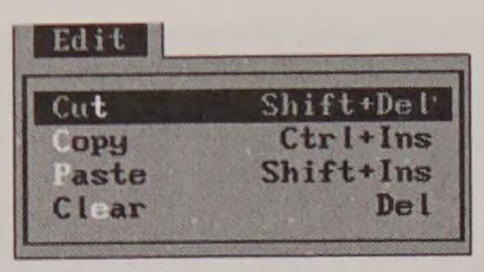


Fig. 11.6
Notice the shortcut keys for each of the commands on the Edit menu.

(Tip)

When editing startup files, don't make too many changes at any one time. Change just a couple of lines and then test your changes by rebooting the computer and testing its operation. If you have a problem, you'll know where to look for the cause.

If everything checks out, save a copy of the file and use it as your new backup while you make another round of changes.

When you're done making changes (for now), exit

After making changes to your startup file, you'll need to save the edited version and close the Editor. Choose File, Exit. The Editor will prompt you to save the file before exiting.

(Tip)

If you want to edit another file before closing the Editor, choose File, Open and specify the next file. The Editor will prompt you to save your changes.

If you were just fooling around with Editor and you don't want to mess up your existing file, choose File, Exit, and say No when Editor prompts you to save your changes.

What if I don't have Edit?

Not to worry. Any text editor or word processor will do for editing your startup files. There are many popular shareware and commercial text editors on the market.

If you use Windows, you can edit the files with Notepad. Windows even includes a handy utility designed specifically for editing startup files. It's called SysEdit. If there's no icon for SysEdit in Program Manager's Main program group, you can use the File, Run command to run the program. The file name is SYSEDIT.EXE and it's normally located in the \WINDOWS\SYSTEM directory.

If you use a word processor, be sure to save the file in plain text format, not in the word processor's own normal file format. If you let the word processor have its way, it'll insert a lot of extra formatting information that you and DOS don't want in your startup files—stuff like font choices, margins, indents, and so on. Fortunately, just about every word processor I've ever seen will let you save a document as a text file. You use the Save As command (or its equivalent) and look for an option to specify the file format. Select ASCII, Plain Text, or DOS Text. That should do the trick.

12 Disaster Prevention: Back Up! Back Up! Back Up!

In this chapter:

- What is backing up and why should I do it?
- What to do before you back up...
- ...and after you back up
- There are different types of backups
- Lots of things to do with Microsoft Backup
- Other options for backing up

There are two kinds of computer users: those who* have lost *data and those who* will lose *data. The ultimate answer to this problem is always the same: make backups!

Making backup copies of your files is the single most important thing you can do to protect your data and your computer system. There may be ways to *recover* from data loss, but there is no better way to *prevent* data loss than to keep good backups. Read this chapter carefully and take it to heart. Someday you will be glad you did.

What's a backup and how do I get one?

A **backup** is a copy of your computer files that you can store safely away from your computer.

You need records of your business travel so your boss can't question your expense reports. You need your checking account deposit slips to make sure your monthly statement is right. And you need backups of every piece of information stored on your computer so you never have to worry about disk failures, software viruses, or a mistyped DEL command.

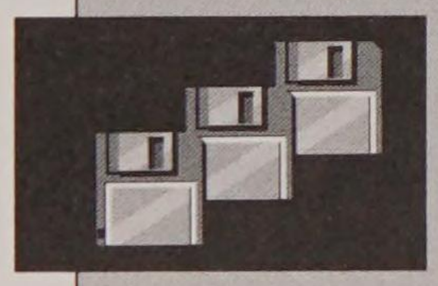
You can make backups in a few ways:

- To back up a few files, use the COPY command.

{Note} Copying files to a different directory on your hard disk doesn't count as backing up. If something happens to the hard disk, both copies are lost. Also, it's a waste of hard disk space.

- To back up a floppy disk, such as your original DOS disks, use the DISKCOPY command.
- To back up your hard disk, use a backup utility program, like MICROSOFT BACKUP that comes with DOS 6.0 or higher.

What's the difference between copying and backing up?



Nothing, if you are talking about a few files or even a whole floppy disk. Go ahead and use the COPY command or the DISKCOPY command to back up in that case. But if you have a lot of data—like a whole hard drive—it would take forever, and zillions of disks, to back up using the COPY command.

Backup utilities are designed to handle large amounts of data. They don't just copy the data, they archive it, which means they change the format so that more data fits in less space. Instead of needing zillions of disks to back up your hard drive, you only need half a zillion. Of course, this means you can't just use the files on the backup disks, or even just copy them back to the hard disk. You have to use the Backup utility to restore the files for use. You'll learn how to restore data in Chapter 13, "Restoring the Backup (and You Will)."

You can back up to any storage device that you can take away from your computer, like diskettes or a cassette tape. Then, you can take the backup copies someplace else—like home, or to a safety deposit box, or to your brother-in-law's.

Why is a backup so important?

Imagine spending two days at your computer developing a 150-page report for a 9:00 a.m. Wednesday deadline. You go to bed Tuesday at 1:30 a.m., with everything perfect. You get back to your desk at 7:00 a.m. Wednesday, ready to print the report. You start your PC and this message appears:

```
General failure reading drive C. Abort, retry, fail?
```

If you made a backup Tuesday night, you simply locate another PC and print your report. If you did not make a backup, you tear out all of your hair and catch a bus to Newark.

This is not an exaggeration. This happens. It has happened to me. It *will* happen to you. It is the reason you will get into the habit of backing up your program and data files.

When should I back up?

How often you back up depends on you and the work you do. Ask yourself these questions:

- If my hard disk fails right now, how much data will I lose?
- If my hard disk fails right now, how long will it take me to recreate the data that I need?

DOS doesn't remind you to back up, you have to take responsibility for it yourself. The trick is to develop a backup schedule and then to stick to it.

Here are a few suggestions for a successful backup schedule:

- Once a week, back up all data on your hard disk.
- Once a day, back up all new files, or files that have changed since the last time you backed up.

- If you're working with data that's very important, or if you can't afford to spend time recreating it, back it up *more* than once a day.
- Back up to two sets of disks (or tapes) on an alternating basis—that way, if something happens to one backup set, you still have another.

(Tip)

Every software manual you have—including DOS—starts with instructions for backing up the original diskettes. You should back up the diskettes before you install the software, put the originals in a safe place, then use the backups for installation. If something doesn't work right, you still have the original disks.

What does it mean to *restore* a backup?

When you need the data from your backup, you **restore** it onto your computer (or someone else's, if your's has bit the dust). It just means to make the backup available for use, or to take the files from the backup and make them your original, working files.

If you copied the files with COPY, you can use COPY to get them back to the hard disk. If you backed up the files with a backup utility, you need to use a **restore utility** to get them back to the hard disk.

Things to think about before backing up

If you are copying a file to a floppy disk, there's not much to consider before backing up. If you are using DISKCOPY or a backup utility, however, you've got to take care of a few things, first.

Is the hard disk healthy?

When you copy an entire disk, you get the good with the bad. That means that errors, bad sectors, and other problems are copied along with the data files. Before you copy a disk with DISKCOPY or a backup utility, check the disk for problems that you may be able to fix (see fig. 12.1).

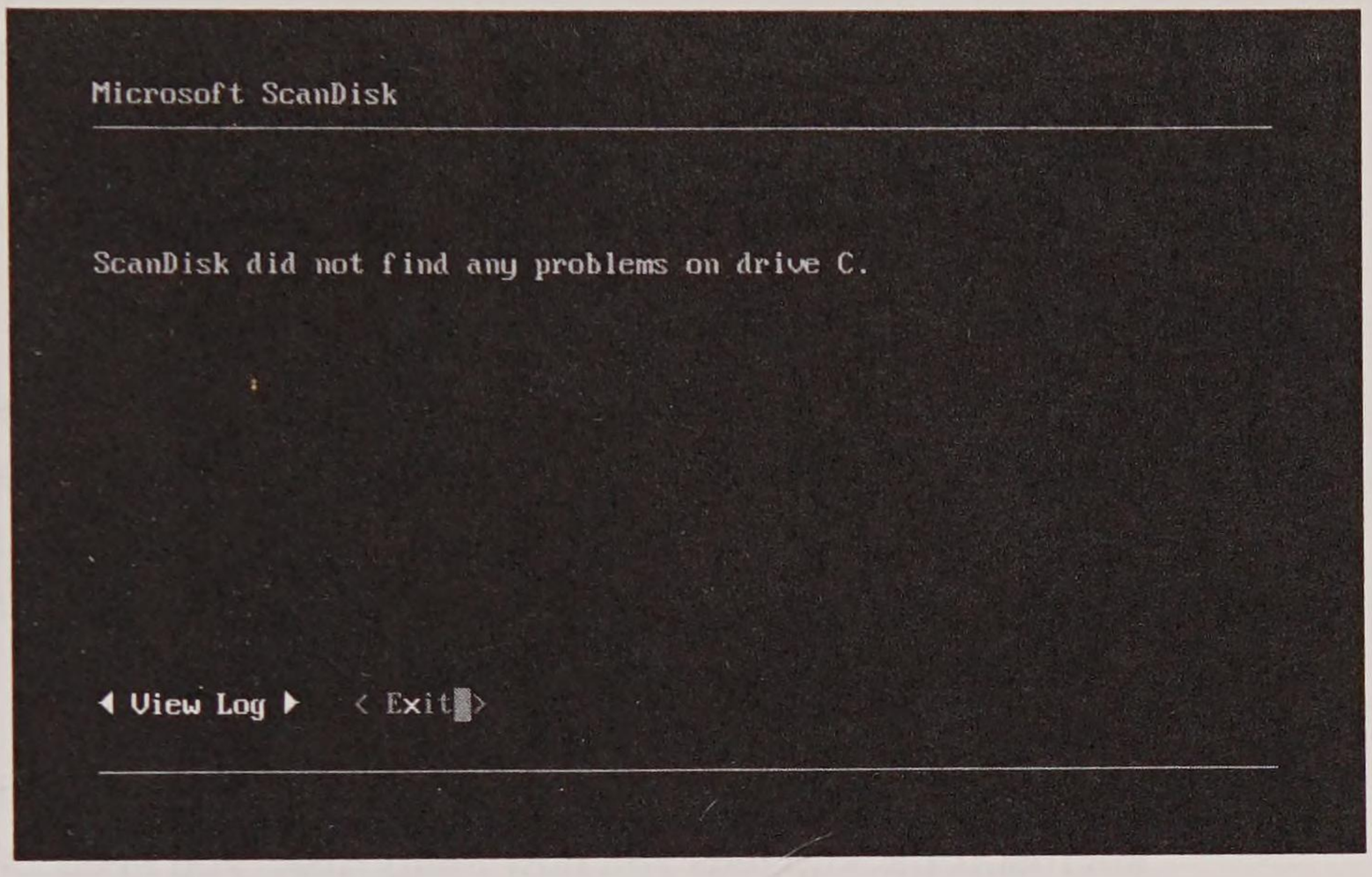


Fig. 12.1
SCANDISK is one command you can use to check your disk so you don't back up problems along with your data.

The following table lists the DOS commands you can use to make sure your disk is in good health.

Command	What it looks for	For more info
CHKDSK	data integrity	See Chapter 14
SCANDISK	file structure	See Chapter 14
DEFRAG	fragmentation	See Chapter 14
MSAV	software viruses	See Chapter 15

Q&A

I found a problem with the disk, and I can't fix it.

You may be able to save the data files even if the disk is shot. Try using the COPY command to copy the files that you need to a good disk one by one. If DOS asks whether to Abort, Retry, or Ignore the error, you can try pressing "I" to see what happens when DOS ignores the problem. You might be able to salvage the file and save it with a new name on a new disk.

How many floppy disks do you need?

It is absolutely amazing how much data a hard drive holds. You won't believe it until you do your first full backup, and your fingers cramp up from swapping disks in and out of your floppy drive.

Even though a backup utility changes the format of your data so it takes up less space, you are still going to need a lot of diskettes, so stock up. The disks don't need to be formatted, but they should be blank. Also, it helps if they are the right size for your PC (go back to Chapter 6, "DOS Stuff You Can Do with Disks," if you have no idea what I'm talking about).

To find out how many you need, ask the backup utility. For example, Microsoft Backup tells you how many disks you need as soon as you choose how many files you want to backup (see fig. 12.2).

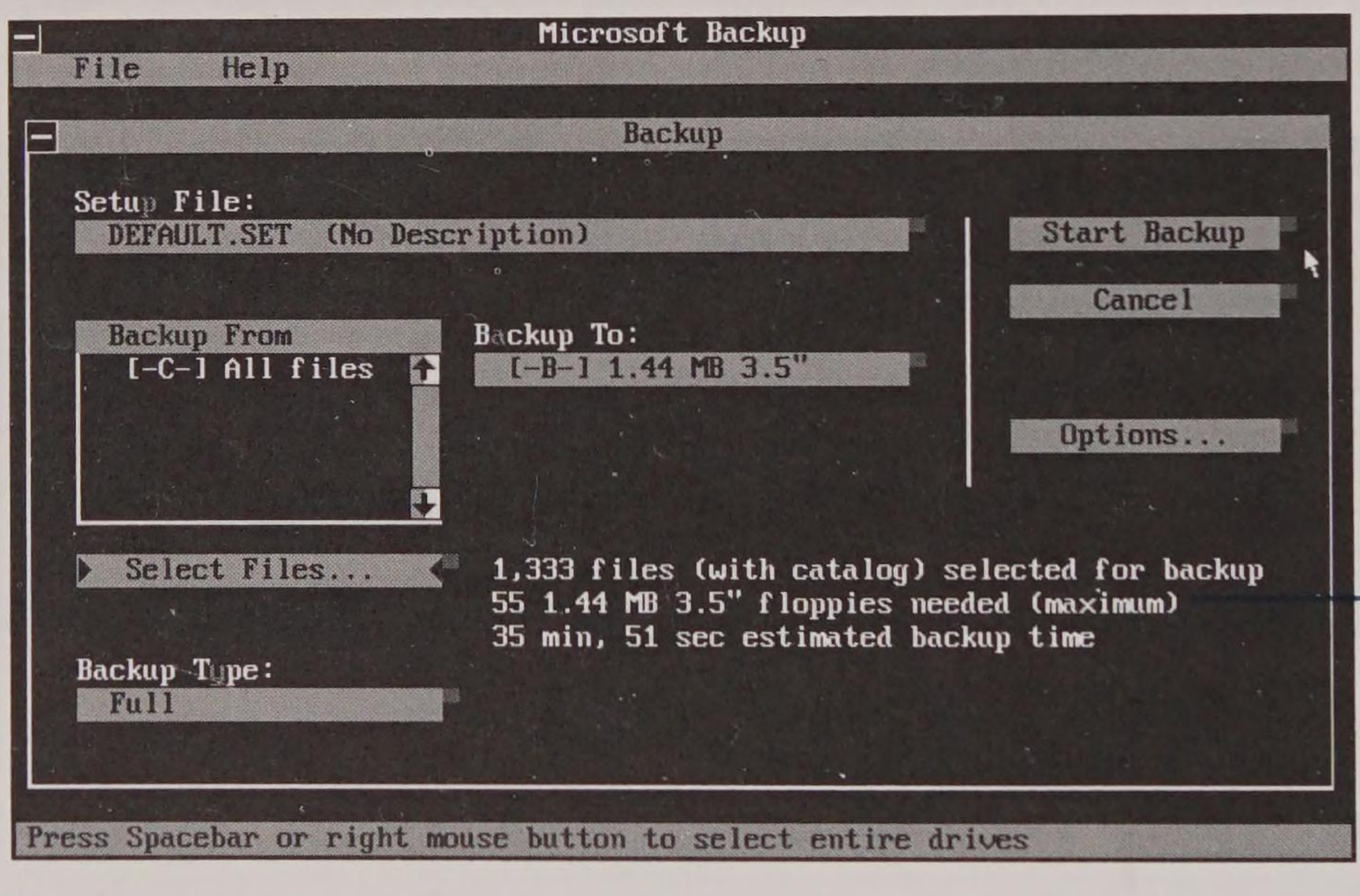


Fig. 12.2
Some backup utilities, like Microsoft Backup, tell you how many disks you will need to complete the backup.

You also can estimate how many disks you will need by figuring out how many megabytes of data you are going to back up. You can do that by dividing the number of bytes by 1 million. To figure out the size of one file or directory, use the DIR command, as shown in figure 12.3. To figure out the size of the data on a whole disk, use the CHKDSK command, as shown in figure 12.4.

Fig. 12.3
A directory listing shows you how big a file is in bytes.

```
C:\>DIR \DATA\LETTERS

 Volume in drive C is DRIVEC
 Volume Serial Number is 1D68-8455
 Directory of C:\DATA\LETTERS

.            <DIR>      09-08-94  12:31p
..           <DIR>      09-08-94  12:31p
BETHMEMO DOC      14848 05-09-94  11:44a
CHRISMEM DOC      12288 07-27-94   4:34p
FLYNN    DOC      12288 09-07-94   2:48p
QUEMEM   DOC      14848 05-09-94  11:46a
TOMMEMO  DOC      13824 07-27-94   3:35p
TOJILL   DOC      12288 03-06-94   9:35p
TOROBIN  DOC      23040 07-09-94  12:25p
PIKOR94  DOC      14848 11-07-94  10:28a
FLYNN94  DOC      25600 11-07-94  10:21a
CHAMP94  DOC      12800 11-07-94  10:17a
       12 file(s)     156672 bytes
                     6129664 bytes free

C:\>
```

File size — *Directory size*

Fig. 12.4
A CHKDSK report shows you how much data is stored on your disk.

```
C:\>CHKDSK

Volume DRIVEC      created 03-27-1994 11:23a
Volume Serial Number is 1D68-8455

  85018624 bytes total disk space
   8194048 bytes in 10 hidden files
    120832 bytes in 47 directories
  70533120 bytes in 1341 user files
   6170624 bytes available on disk

      2048 bytes in each allocation unit
     41513 total allocation units on disk
      3013 available allocation units on disk

    655360 total bytes memory
    585680 bytes free

C:\>
```

Amount of used disk space

Use the numbers in the following table to figure out how many disks you'll need:

Size of Data to Back Up	Disk Capacity 360K	720K	1.2M	1.44M
10 MB	29	15	9	8
20 MB	59	29	18	15
30 MB	83	44	27	22
40 MB	116	58	35	29
70 MB	200	100	60	50

(Tip)

Don't forget the labels! I always seem to run out of disk labels before I run out of disks, and it is very important that you label backup disks accurately. Make sure you have enough disk labels before you start the backup.

Things you should do after backing up

If you are going to make the effort to back up regularly, you may as well go one step further and make sure the backups are good. Here are a few things you can do after backing up to make sure you didn't waste your time:

- Count your disks. Check that you used about the number of disks you expected to use.
- Check the disk labels. Check that you labeled each disk with the date and the order in which it was used during the backup.
- Compare the data. Many backup utilities (including Microsoft Backup) come with a COMPARE command that lets you compare the backed up data to the original data.
- Restore a few files. If your backup utility lets you restore an individual file or two, go ahead and try it.

- Put the backup disks someplace safe. If your office burns down and the backups are sitting on your desk, what good was backing up?

(Tip)

Invest in a small fire-proof safe for storing your backups and your original software diskettes. Then, be sure to keep the safe on the floor, where it has the best chance of surviving. Of course, for absolute security keep one backup set someplace else—like a safety deposit box at the bank, or your mother's house.

How you back up depends on your version of DOS

Different versions of DOS have different commands for backing up and restoring files. That means that not all versions of DOS can restore files backed up with another version of DOS, which may be a problem if you have to restore a backup onto a different computer.

The following table describes the backup and restore commands for different DOS versions. The rest of this chapter explains each method; restoring is covered in Chapter 13, "Restoring the Backup (and You Will)."

If you have	You use	You can restore backups
DOS earlier than 3.3	BACKUP and RESTORE	From DOS earlier than 3.3
DOS 3.3 through 5.X	BACKUP and RESTORE	From DOS 3.3 through 5.X
DOS 6.X	Microsoft Backup	From DOS 3.3 through DOS 6.X

{Note}

DOS 6.0 and 6.2 have the RESTORE command as well as the Microsoft Backup program. That means that if you have DOS 6.0 or 6.2, you can restore files backed up with earlier versions of DOS.

(Tip)

If you know that you must restore a backup on a computer running an earlier version of DOS, make sure you use that earlier version of DOS to create the Backup. Or, you can upgrade the DOS on the other computer.

Backing up with DOS version 5 and earlier

With DOS version 5 or earlier, you use the BACKUP command to back up files. It is not the most graceful of DOS commands, so you may want to invest in a backup utility program, like FastBack Plus. Until you do, however, you should know how to use this one.

(Tip)

If you have DOS version 6 or later, skip this section and go to the section called "Backing up with DOS version 6 and later."

Backing up the entire hard disk

When you have all the floppy disks you think you will need and a lot of time, try backing up everything on your hard disk C:. You can use the DOS Shell or work from the DOS prompt.

(Tip)

On each disk label, write the date and the disk number. For example, if it was the third disk you used in the backup, make sure it says #3. When you restore the data, you have to put the disks in the right order.

From the DOS Shell

If you use the DOS Shell, follow these steps:

1. Choose Backup Fixed Disk from the Disk Utilities program group. The Backup Fixed Disk dialog box opens, as shown in figure 12.5.

   The command line in the dialog box is all set to back up everything on your hard disk C: to floppy disks in drive A:, which just happens to be what you want to do.

2. Choose OK. DOS starts the backup.

3. Insert the disks when DOS asks, being sure each one is labeled correctly.

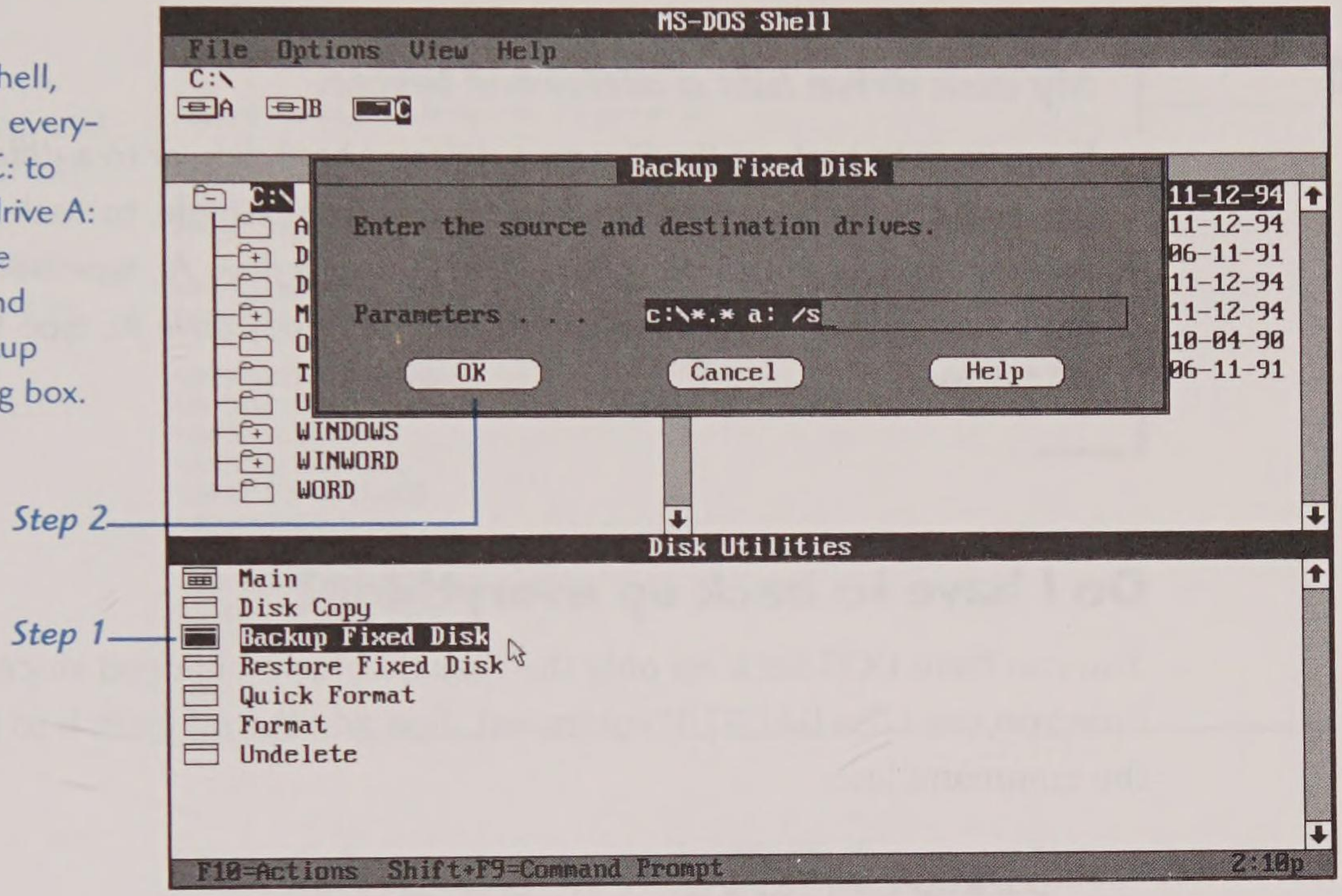


Fig. 12.5
With the DOS Shell, you can backup everything on drive C: to floppy disks in drive A: by accepting the default command line in the Backup Fixed Disk dialog box.

From the DOS Prompt

Type **backup c:*.* a:/s** and press Enter. DOS starts the backup and prompts you to insert disks into drive A: (see fig. 12.6).

```
C:\>backup c:\*.* a:/s

Insert backup diskette 01 in drive A:

WARNING! Files in the target drive
A:\ root directory will be erased
Press any key to continue . . .
```

Fig. 12.6
Like any DOS command when you use BACKUP from the DOS prompt, you have to include the command, the path, and the necessary switches. In this case, /S is the switch for including all subdirectories.

Q&A

I get the message `Bad command or file name` ***when I type "backup" at the DOS prompt.***

BACKUP is an external command stored in your DOS directory. You may need to add the path to the DOS directory on the command line, like this:

c:\dos\backup c:*.* a:/s

Q&A

My disk drive has a different letter.

If you want to back up the files on a different hard disk, or to a different floppy disk, just change the disk letter names. For example, to back up everything on your hard drive D: to disks in floppy drive A:, type **backup d:*.* a:/s**. To back up from hard drive D: to floppy drive B:, type **backup d:*.* b:/s**.

Do I have to back up everything?

You can have DOS back up only the files that have changed since the last time you used the BACKUP command. Just add the /M switch to the end of the command line:

```
backup c:\*.* a:/s/m
```

I just want to back up a directory or two

You can tell DOS which directories to back up by changing the path in the BACKUP command line. This can save a lot of time and disk space. For example, to back up just the files in your C:\DATA directory, type this:

```
backup c:\data\*.* a:/s
```

You can even take this one step further, and use wild cards to back up just a particular group of files. For example, to back up just the files in your C:\DATA directory that have a DOC extension, type this (see fig. 12.7):

```
backup c:\data\*.doc a:
```

```
C:\>backup c:\data\*.doc a:

Insert backup diskette 01 in drive A:

WARNING! Files in the target drive
A:\ root directory will be erased
Press any key to continue . . .

*** Backing up files to drive A: ***
Diskette Number: 01

\DATA\BETHMEMO.DOC
\DATA\CHRISMEM.DOC
\DATA\FLYNN.DOC
\DATA\QUEMEM.DOC
\DATA\TOMMEMO.DOC
\DATA\TOJILL.DOC
\DATA\TOROBIN.DOC
\DATA\PIKOR94.DOC
\DATA\FLYNN94.DOC
\DATA\CHAMP94.DOC

C:\>
```

Fig. 12.7
You can include a directory path and wild cards in the BACKUP command line to tell DOS which directory and files you want to back up.

Backing up with DOS version 6 and later

With DOS 6 or later, you make backups using the Microsoft Backup utility program. Microsoft Backup is easier to use because you don't have to mess around with the command line. To some people, Microsoft Backup may seem more confusing because it offers you a lot more options; but most people will think it's a lot easier to use than the old BACKUP command. From the DOS prompt, type **msbackup** and press Enter.

(Tip)

If you have Windows 3.1 or later and MS-DOS 6.0 or later, you may be able to access Microsoft Backup from Windows. Look for a Microsoft Tools program group or a Tools menu in File Manager. After you open the program, it works very much like the DOS version described here.

Q&A

I get the message `Bad command or file name` ***when I try to start Microsoft Backup.***

Microsoft Backup is an optional DOS program. You have to choose to install it during Setup. If you didn't install it, don't worry; use Setup to install it now.

How to use Microsoft Backup

In Microsoft Backup, you make choices using menus, dialog boxes, and command buttons (see fig. 12.8). If you have a mouse, you can use it to click your choices. If you don't have a mouse, you can use your keyboard.

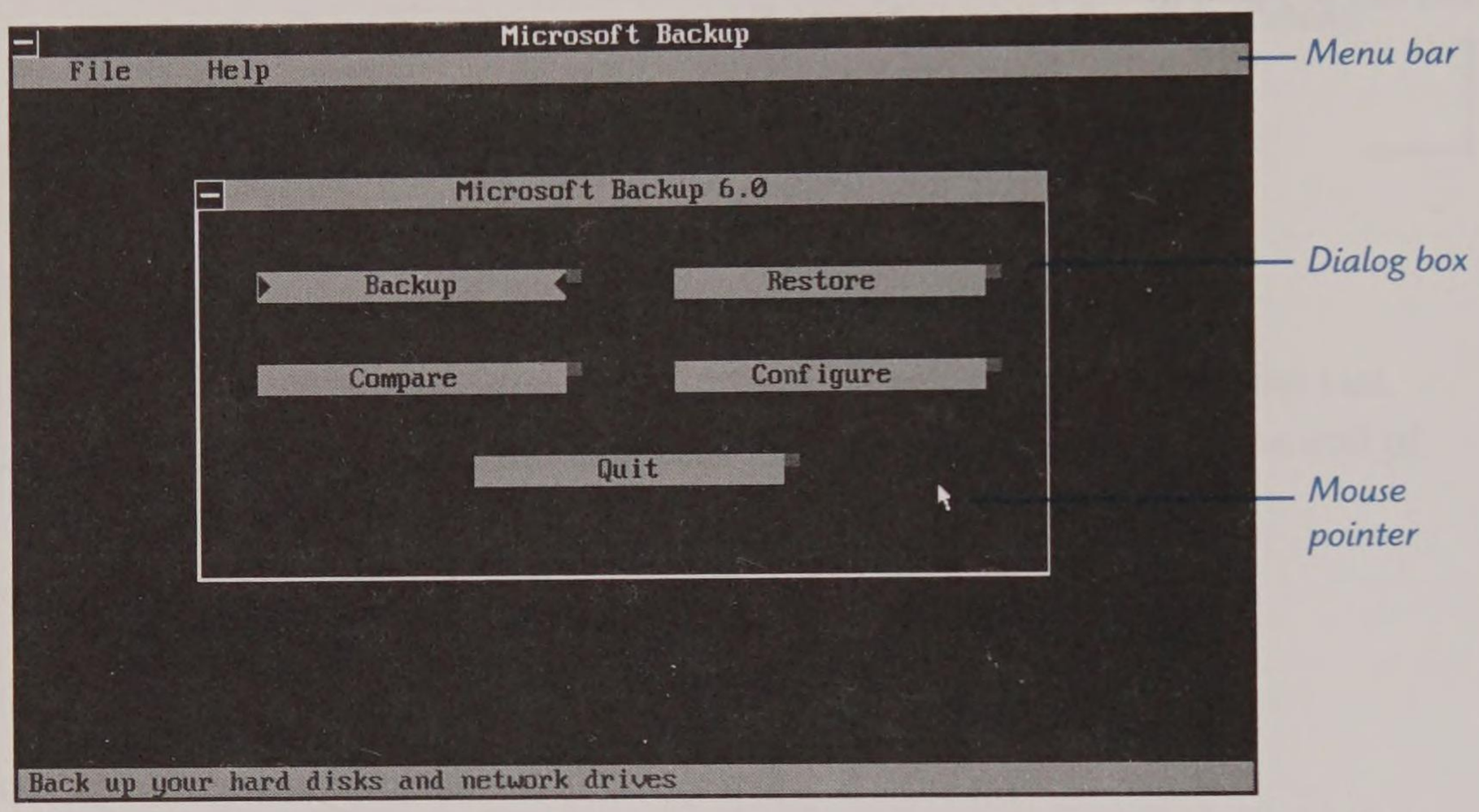


Fig. 12.8
Microsoft Backup looks nothing like DOS, but a bit like the MS-DOS Editor.

Here are the basic ways you work in Microsoft Backup:

- Selected buttons in a dialog box usually are highlighted and have little arrowheads on each side.
- To move around to other buttons, click the button, press Tab, or press the highlighted letter in the button name.
- To display a list of choices—like drive names or setup files—double-click the button; or Tab to it and press the space bar.
- To open a menu, click the menu name; or press Alt to make the menu bar active, use the arrow keys to highlight the menu name, then press Enter.
- To choose a command from a menu, click the command name, or highlight the command and press Enter.
- To get back to DOS, choose Exit from the File menu.
- To accept the choices in a dialog box, choose OK, or press Enter.
- To clear the dialog box without making choices, choose Cancel, or press Esc.

Backing up the entire hard disk

The backup most commonly performed by users of DOS is the full backup from drive C: to drive A:. So, to back up all files on hard disk C: to floppy disks in drive A: with Microsoft Backup, you need to accept the settings in the Backup dialog box and then start the backup. It's a simple procedure; just follow these steps:

1 Choose Backup from the main dialog box. The Backup dialog box opens (see fig. 12.9).

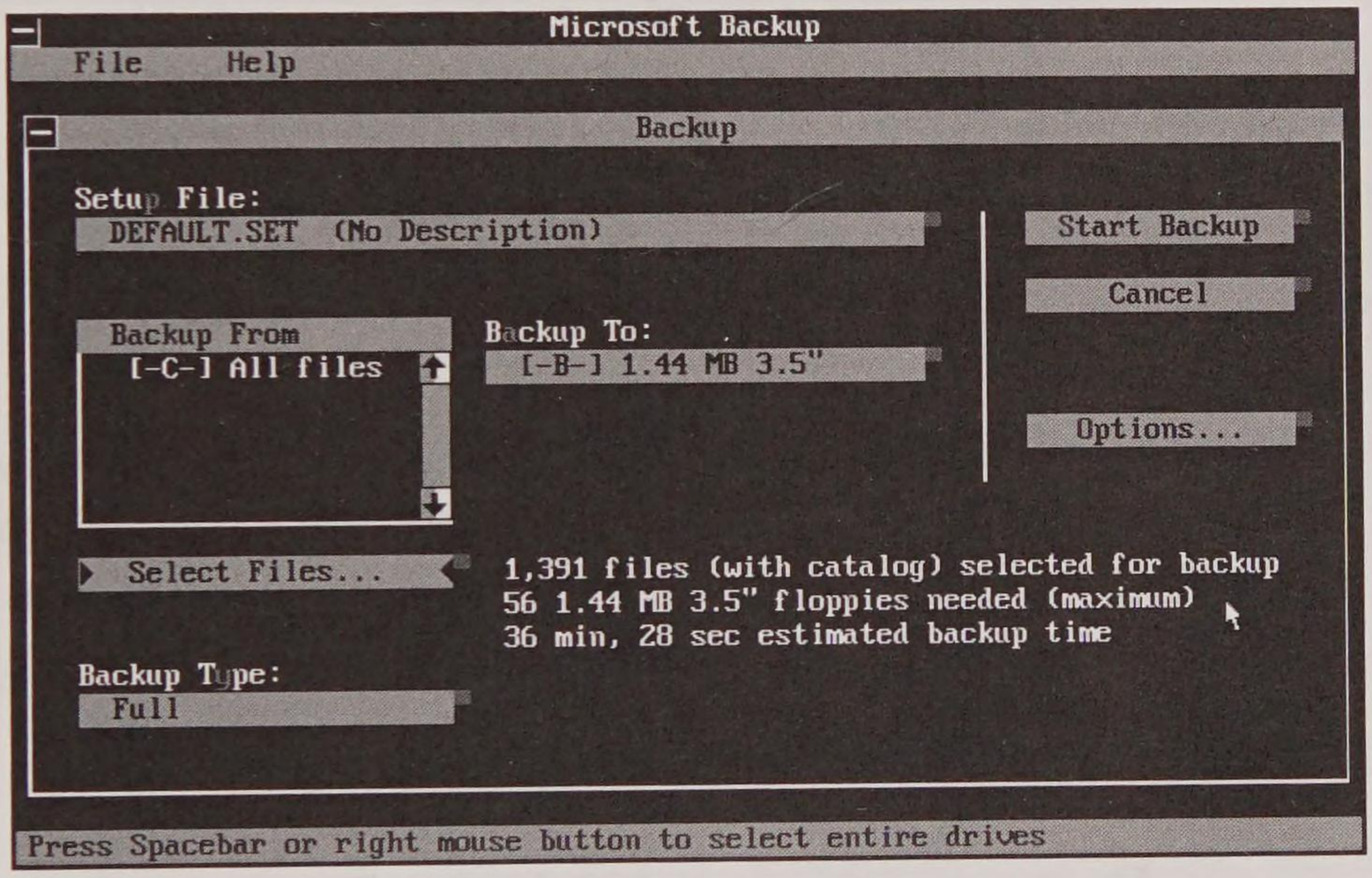


Fig. 12.9
You can change the selections in the Backup dialog box, or just start the backup.

2 Choose drive C: under the Backup From button.

3 Choose All files on drive C:.

4 Choose Start Backup.

Q&A

The Start Backup button doesn't work.

You can't start the backup until you choose the files you want to back up. As soon as you choose All files on drive C:, the Start Backup button is available for action.

During the backup, the program displays a status screen so you know about how much longer you have to sit there swapping disks. When the backup is complete, the program displays a status report, telling you how long you sat there swapping disks (see fig. 12.10).

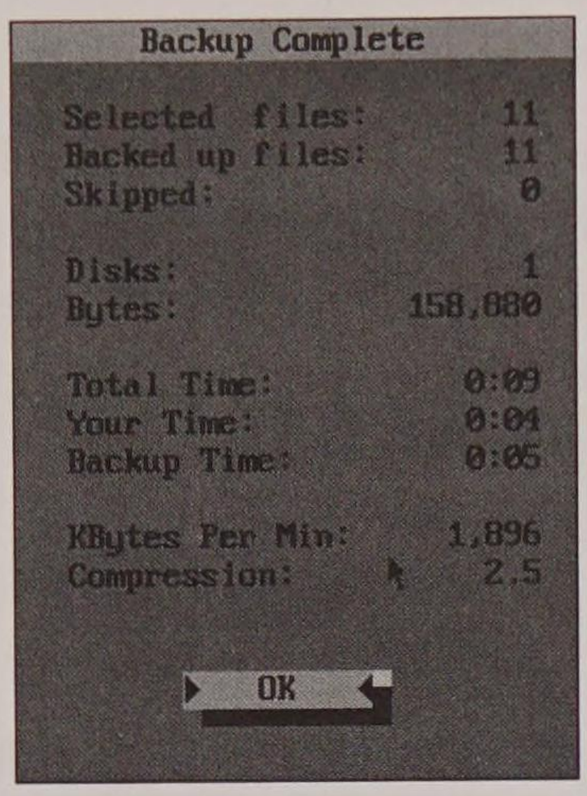


Fig. 12.10
In the Backup Complete report, you can find out stuff like how long the backup took, how many disks were used, and how many files were backed up.

Neat things you can do with Microsoft Backup

Microsoft Backup makes it easy to do a lot more than you could with the old BACKUP command. For example, you can select files from all over the hard disk, no matter what directory they are in. You can save a setup file of your backup choices, to use again and again. And you can compare the backup to the original to see if they match.

Run a compatibility test

The first time you use Microsoft Backup, it is probably going to want to run a compatibility test. This is a good thing to do, although it takes a few minutes, and you need to have two blank disks ready. This is how it works:

1. Choose Configure from the Microsoft Backup main screen.
2. Sit there and watch as Microsoft Backup checks your system to see what hardware you use (press Enter if it asks you to confirm anything).
3. Choose Compatibility Test from the Configure dialog box, then choose Start Test.
4. Do whatever Microsoft Backup tells you to do, including inserting disks and choosing OK a few times.
5. Back at the Configure dialog box, choose Save to save the configuration settings. Microsoft Backup displays the main dialog box.

Pick and choose the files you want to back up

Sure, with BACKUP you could select directories or groups of files for backing up; but with Microsoft Backup, you can select any file, anywhere. This is how:

1. Choose Backup from the main screen. The Backup dialog box opens.
2. Choose the Select Files button at the bottom of the screen. The Select Backup Files screen appears, as displayed in figure 12.11.

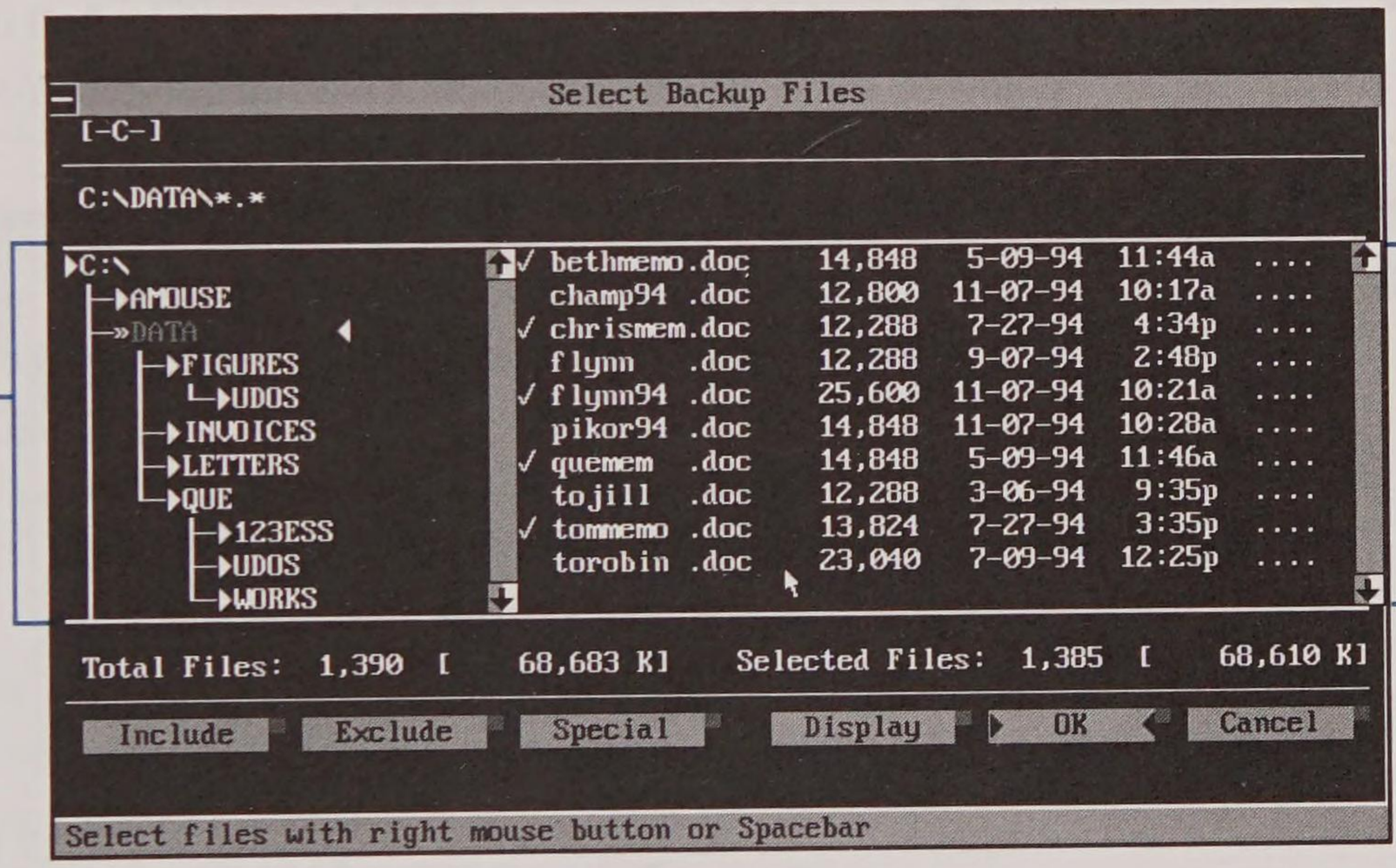


Fig. 12.11
You can pick and choose files to backup from anywhere on the disk.

3. Choose the files you want to back up. To choose or unchoose a directory or file, highlight it with the arrow keys, then press the space bar. With a mouse, point at it and click the right mouse button. A checkmark appears beside all selected files, and an arrowhead appears beside selected directories.
4. Choose OK to go back to the Backup dialog box and choose Start Backup to start the backup.

Make a different type of backup

MS Backup offers you a choice of three backup types:

- A **full backup** makes backup copies of every file you select before starting the backup. You have to select the files you want. (You can select all files, or individual files.)
- An **incremental backup** makes backup copies of all the files that have changed since the last time you ran a full or incremental backup. You don't have to select any files—MS Backup does it for you.
- A **differential backup** makes backup copies of all the files that have changed since the last time you ran a full backup. You don't have to select any files—MS Backup does it for you.

(Tip)

You can schedule a combination of these backup types to make sure your backups are up-to-date. For example, do a full backup once a week and an incremental backup once a day.

Compare backup files to the original files

The Compare feature of Microsoft Backup lets you check whether or not the backup files are exact copies of the original files. Use Compare to make sure the backup is true to the original. If it isn't, you should probably back up again, maybe using different diskettes.

To compare the entire backup right after you make it, choose Compare from the Microsoft Backup main dialog box, specify the drive you want to compare under the Compare Files button, and follow the instructions.

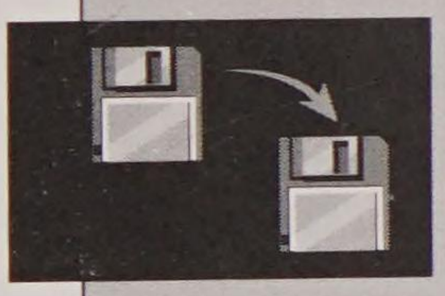
Glub—I'm drowning in diskettes

I warned you about the diskette thing. If you are conscientious about backing up, you will soon end up with an entire room full of carefully labeled, carefully stored diskettes. You may need the Dewey Decimal system to keep

track of them all. But there are steps you can take to alleviate this situation, such as the following:

- Consider a tape drive. Tape drives are ideal for backing up, because you can fit so much more data on one tape than on anything else currently available.
- Back up to another hard disk. Although backing up to another hard disk inside your computer isn't the ideal solution, it works. If one disk fails, you still have the other. If you have an external hard disk, however, go ahead and back away! It's not like you can tuck a hard disk in your shirt pocket to take it someplace safe, but you can carry it away if you really have to.

Save your setup file to back up the same stuff again without working so hard



If you back up the same files to the same disk on a regular basis, you can save time and energy by saving your choices in a setup file to use again and again. Instead of going through the Backup dialog box and choosing the files, destination disk, and everything else, you just choose the setup file, then choose Start Backup.

To make a setup file, do this:

1. Choose Backup from the main dialog box.
2. Make the selections you need for the backup in the Backup dialog box.
3. Choose the File menu name from the menu bar to open the File menu.
4. Choose Save Setup As from the File menu.

   The Save Setup File dialog box opens.
5. In the File Name text box, type a file name that describes the backup—like DAILY for the incremental backup you do every day, or WEEKLY for the full backup you do every week.
6. Choose the Save button.

To use a setup file, follow these steps:

1. Choose Backup from the main dialog box.
2. Click the Setup File button to display a list of setup files. With the keyboard, highlight the button and then press the spacebar.
3. Choose the setup file you want to use.
4. Choose the Open button.
5. Choose Start Backup.

13 Restoring the Backup (and You Will)

In this chapter:

- When should I restore?
- Before you restore, some stuff you should know
- How to restore with DOS RESTORE
- How to restore with Microsoft Backup

If you have backups, you needn't fear power surges or software viruses. You have the power to restore!

This chapter assumes you also have the willingness to back up. If you skipped Chapter 12, "Disaster Prevention: Back Up! Back Up! Back Up!," there's no use reading this because you have nothing to restore from. Get to work recreating in all the files you lost.

Some basics about the Restore feature

Restore is pretty smart. It realizes that if you are at the point of restoring your files, you are in no mood for playing games. Here are some of the ways restore makes life easy for you, even under difficult circumstances:

- Restore puts files back where it found 'em. This means your directory tree will look the same after a restore as it did before the disaster that prompted the restore.
- Restore lets you choose which files you need back. If you didn't wipe out your whole hard disk, you don't need to restore the whole hard disk. You can choose the files you want to restore.

- Restore doesn't erase the backup. If you are more accident prone than most people, you can use one set of backup disks to restore many times.

(Tip)

If you don't have backups, restore won't help, but something else might. Read Chapter 26, "Troubleshooting Tips That Anybody Can Try," to find out if there's any hope.

If you need to restore files, take a minute to remember which version of DOS was used to make the backup, and which version of DOS you are using to do the restore. The best thing is to use the same DOS version for both; but you may be able to get away with restoring a backup created with an earlier DOS version. Use the handy table in Chapter 12, "Disaster Prevention: Back Up! Back Up! Back Up!," to figure out which DOS versions can restore which backups.

When do I restore?

This is one of those "If you have to ask you don't get it" questions. Basically, you have to restore if your original data has been damaged or erased and you can't recover it any other way—in other words, when there's a disaster.

Disasters come in all shapes and sizes, and you should be prepared for them all.

(Tip)

Try UNDELETE if you realize immediately that you need to recover a few accidentally deleted files (discussed in Chapter 8, "Deleting All Those Darn Copies"), or UNFORMAT to recover an accidentally formatted disk (discussed in Chapter 6, "DOS Stuff You Can Do with Disks").

Is it just a headache...

If something like a data error or an accidental deletion destroys an important file, it's a headache. You can use your most recent backup disks to restore the file.

These are some causes of a minor problem:

- A power surge caused your PC to crash, damaging some of your data files.
- You deleted a directory that contains a file you need.
- You deleted a file but don't realize it until it's too late to use UNDELETE.

...or a disaster?

If no matter what command you type, you see the message `File not found`, it's a disaster (see fig. 13.1). Something happened to destroy every file on your hard disk and you will have to restore them all using your most recent full backup.

Fig. 13.1
If DOS can't find any data files on your hard disk, you will have to go ahead with a full restore.

```
C:\>type autoexec.bat
File not found - AUTOEXEC.BAT

C:\>type config.sys
File not found - CONFIG.SYS

C:\>type command.com
File not found - COMMAND.COM

C:\>
```

These are some causes of a disaster:

- A virus got in your disk and ate your files.
- A power surge damaged your disk.
- You misused the DELTREE command in a big way (see Chapter 9, "Organize Your Disk With Directories").

No, it's a catastrophe!!

If you turn on your computer and see the message `Non-system disk or disk error Replace and strike any key when ready`, but there's no disk in drive A:, it's a catastrophe. Somehow, DOS was removed from your hard disk. Not only will you have to restore your data and program files, you are going to have to reinstall DOS.

These are some of the causes of a catastrophe:

- Your hard disk died (they don't last forever, you know).
- A virus destroyed everything on your hard disk.
- You tried to format your hard disk.

In case of emergency, follow these steps

As soon as you realize you have lost data, take action. Try to figure out exactly how much damage has been done so you can plan what to do next. The following are some steps to take:

1. Check out your directory tree to see which files are missing, and write down their names. (See Chapter 5, "How to Examine the Files on Your Disk," for details on the DIR command.)
2. Try to use UNDELETE or UNFORMAT.
3. If you don't have a DOS prompt, use your startup disk to try to boot DOS.
4. If you have to boot from your startup disk, reinstall DOS (see your DOS manual, or Que's *Using DOS 6.2*, Special Edition).
5. If your hard disk is dead, make arrangements to have a new one installed. Find a computer to use in the meantime.

(Tip)

Before you rush out and replace a hard disk you believe has died, try replacing the cables. If a cable isn't working, the hard disk can't respond. Your computer dealer can help you with this.

What to do before you restore

If the data really is gone and you'll have to restore, think about these issues first:

- If you used DOS 5 or earlier, you made the backups using the BACKUP command. To restore the files, you will need to use the RESTORE command.
- If you use DOS 6 or later, you made the backups using Microsoft Backup. You will need to restore them by using Microsoft Backup.
- If you made the backup files by using the COPY command, you won't restore at all. Reread Chapter 7, "How to Copy, Rename, and/or Move Your Files," to find out how to copy files back to your hard disk.

I have lots of different sets of backup disks. Which ones do I use?

If you are real good about backing up, then you have a full backup that is no more than two weeks old and you have daily incremental backups. If you have to restore everything on your hard disk, you need to use your most recent set of full backup disks. If you only need to restore a directory or a file or two, you can probably use the most recent incremental backup.

If you are not so good about backing up, you'll have to use whatever backups you have available. That might mean piecing together the most recent versions of different files and programs from different backup disks, which will take you a long time and make your head spin. You may even have to use the backup disks you made of your application programs.

Now, aren't you glad you have been so organized about scheduling backups and labeling backup disks?

Here are the things you should do before you restore:

- Find your most recent backup disks.
- Find the backups of your original program disks, including DOS.
- Find a computer that has the same version of DOS that you used to create the backups.

How to restore lost files with the RESTORE command

You will use the RESTORE command to restore all files backed up with the BACKUP command. RESTORE is almost exactly like BACKUP, except in reverse.

{Note} If you are restoring files backed up with Microsoft Backup, skip this section and go to the section called "How to restore lost files with Microsoft Backup."

Restoring all files

With the full set of backup disks in hand, you are ready to restore. You can use the DOS Shell or the DOS prompt. Make sure the disks are in the correct order before you start.

From the DOS Shell

If you use the DOS Shell, you start RESTORE from the Disk Utilities program group in the program area. Follow these steps:

1 Choose Restore Fixed Disk from the Disk Utilities program group. The Restore Fixed Disk dialog box opens, as displayed in figure 13.2.

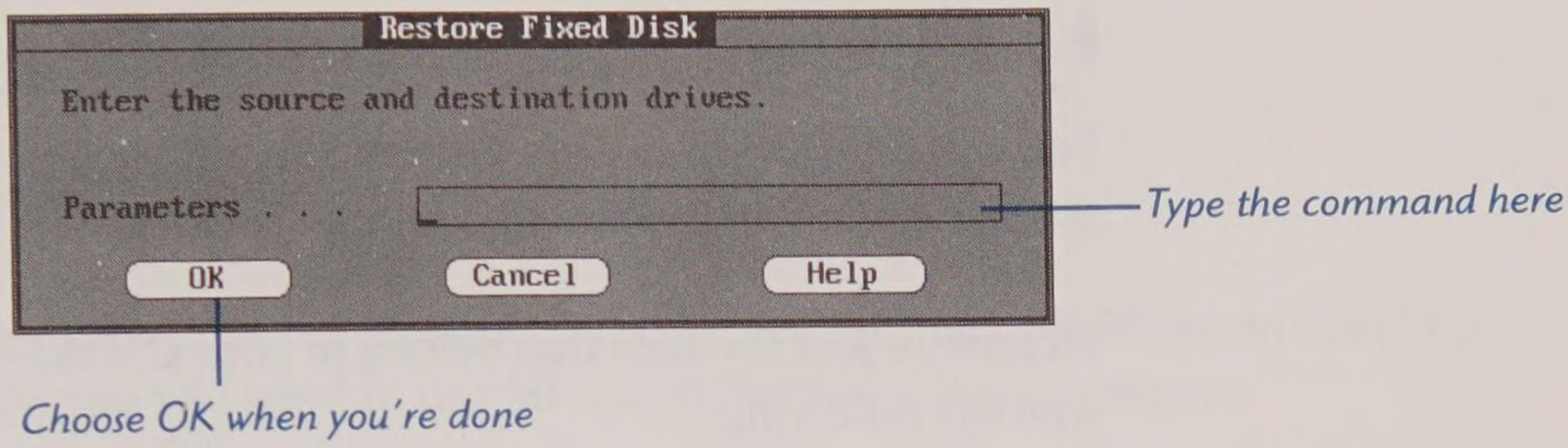


Fig. 13.2
With the DOS Shell, you have to type the same command line in the Restore Fixed Disk dialog box that you would type at the DOS prompt.

2 Type the command line you would use if you were typing the command at the DOS prompt. (Read the next section to find out how to do this.)

3 Choose OK. DOS starts the restore.

4 Insert the disks when DOS asks, being sure to use the disks in the same order in which they were backed up.

From the DOS Prompt

If you use the DOS command line, type **restore a: c:*.*/s** and press Enter. DOS starts the restore and prompts you to insert disks into drive A: (see fig. 13.3).

```
C:\>restore a: c:\*.*/s

Insert backup diskette 01 in drive A:
Press any key to continue . . .
```

Fig. 13.3
RESTORE is the reverse of BACKUP. On the command line, you include the command, the path, and the necessary switches. In this case, /S is the switch for restoring all subdirectories.

Q&A

DOS says *Bad command or file name.*

Don't panic. RESTORE is an external command stored in the DOS directory. Include the path to your DOS directory in the command line, like this: **c:\dos\restore a: c:*.*/s**.

I just want to restore a few files

You can tell DOS to restore a single file, or a group of files, by typing the specific path on the command line. This can save a lot of time.

To restore just the files that belong in your C:\DATA directory, for example, type the following:

restore a: c:\data*.*/s

You can take this one step further, and use wild cards to restore a particular group of files. To restore the files that have a DOC extension to your C:\DATA directory, type the following (see fig. 13.4):

restore a: c:\data*.doc

```
C:\>restore a: c:\data\*.doc

Insert backup diskette 01 in drive A:
Press any key to continue . . .
1
*** Files were backed up 01-08-1995 ***

*** Restoring files from drive A: ***
Diskette: 01
\DATA\BETHMEMO.DOC
\DATA\CHRISMEM.DOC
\DATA\FLYNN.DOC
\DATA\QUEMEM.DOC
\DATA\TOMMEMO.DOC
\DATA\TOJILL.DOC
\DATA\TOROBIN.DOC
\DATA\PIKOR94.DOC
\DATA\FLYNN94.DOC
\DATA\CHAMP94.DOC


C:\>
```

Fig. 13.4
You can include a directory path and wild cards in the RESTORE command line to tell DOS which directory and files you want to restore.

To restore one single file, type the file name in the path on the command line, like this:

restore a: c:\data\memo.doc

How to restore lost files with Microsoft Backup

If you have DOS 6 or later and you backed up using the Microsoft Backup utility, you will need to use Microsoft Backup again to restore.

(Tip)

> If you have DOS 6 or later, you can use the RESTORE command to restore backups made with the BACKUP command. Go back to the previous section, "How to restore lost files with the RESTORE command."

You can start Microsoft Backup in several ways:

- From the DOS Shell, open the Disk Utilities program group and choose Microsoft Backup.
- From the DOS Prompt, type **msbackup** and press Enter.
- If you have Windows 3.1 or later and MS-DOS 6.0 or later, you may be able to access Microsoft Backup from Windows. Look for a Microsoft Tools program group or a Tools menu in File Manager. After you open the program, it works very much like the DOS version described here.

When Microsoft Backup starts, the main dialog box opens (see fig. 13.5). For a refresher on how to use Microsoft Backup, go back to Chapter 12, "Disaster Prevention: Back Up! Back Up! Back Up!"

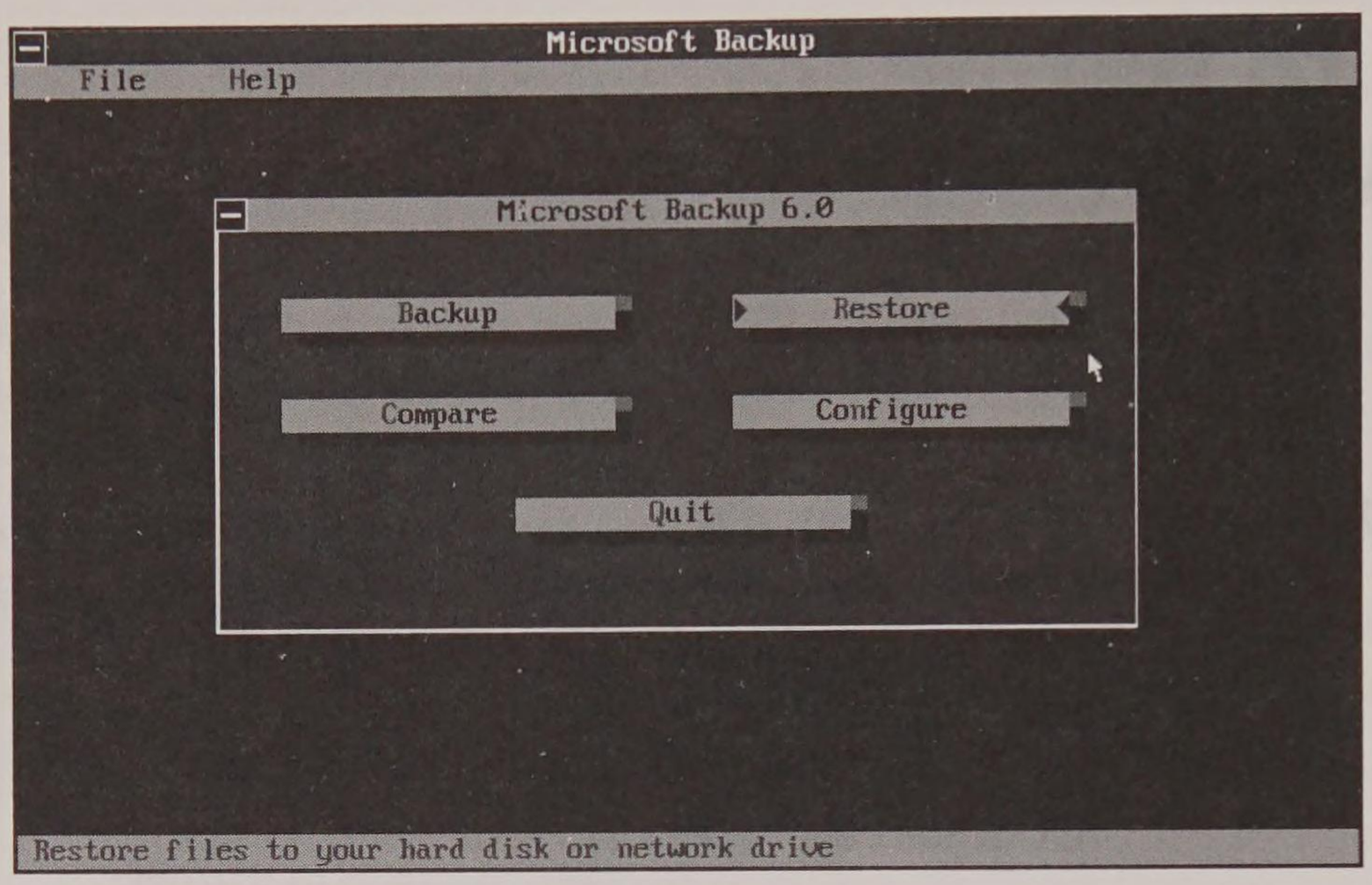


Fig. 13.5
It's called Microsoft Backup, but it can compare and restore files, too.

Remind me—what's a catalog file for?

When you backup with Microsoft Backup, the program automatically creates a backup set catalog file and stores it on the last disk in the set. Microsoft Backup uses the catalog file to match up files for comparing and restoring. It's like a map that Microsoft Backup uses to find where the files are stored on the backup disks.

<Caution> When you restore with Microsoft Backup, you have to tell Microsoft Backup which catalog file is on the backup disks. If you choose the wrong one, Microsoft Backup won't restore the files.

(Tip) When you start the restore process, DOS loads the catalog file for the backup that you did most recently.

Microsoft Backup uses a kind of strange, but infinitely logical, naming scheme for catalog files. If you understand the naming scheme, you can figure out which backup is the most recent, and what type of backup it is, even if you didn't label the disks very well.

This is how the naming scheme works. From left to right, the file name includes the letters of the first and last drives backed up, the last digit of the

year when the backup was performed, the month and day of the backup, the order of the backup if more than one backup was performed that same day, and the backup type. For example, CC41112A.FUL is the first full backup of drive C: performed on November 12, 1994.

Restoring the entire hard disk

To restore all files from the floppy disks in drive A: to hard disk C:, you need to load the correct catalog file, accept the settings in the Restore dialog box, and then start the restore. It's a simple procedure:

1 Choose Restore from the main dialog box. The Restore dialog box opens (see fig. 13.6).

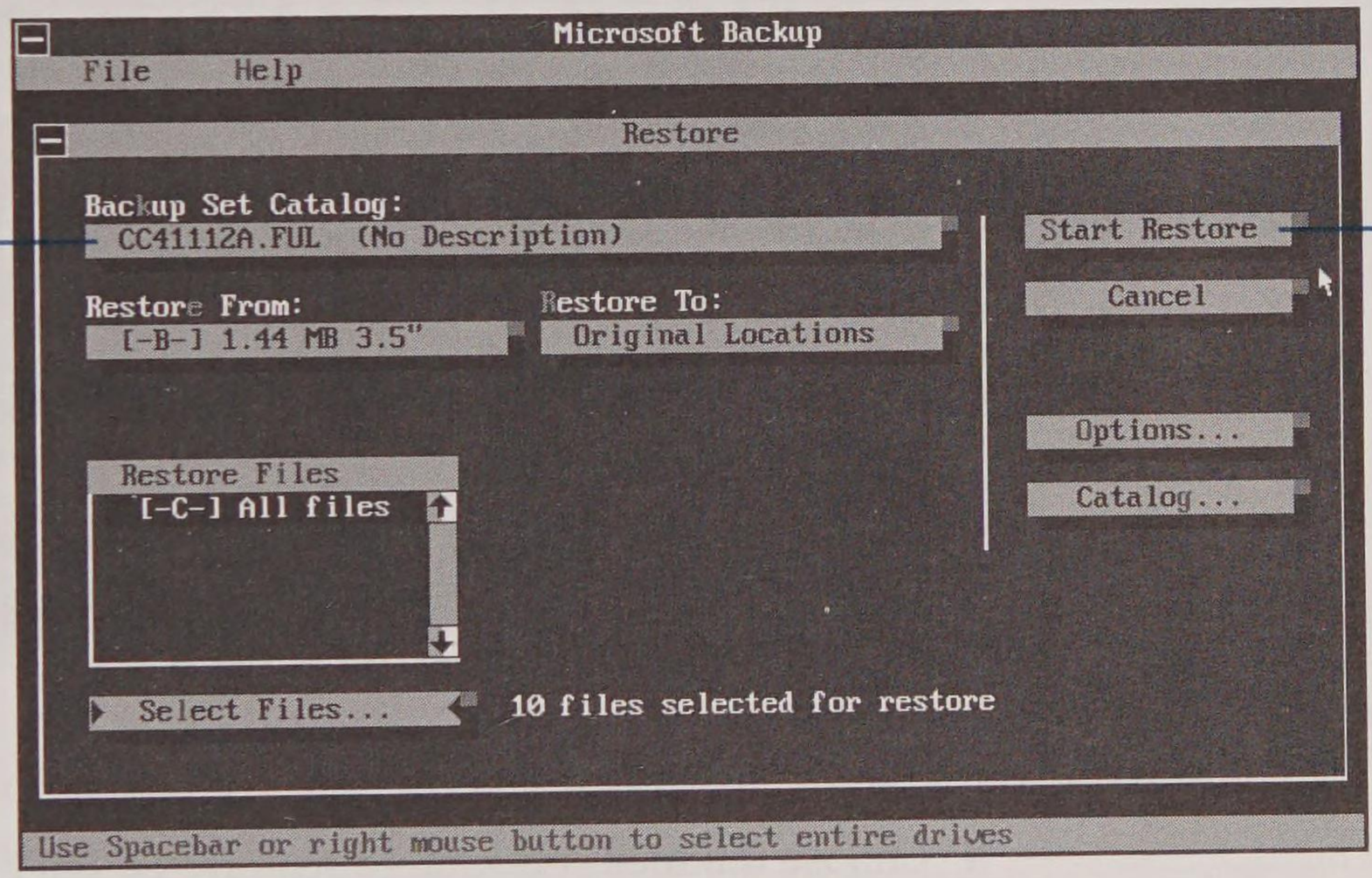


Fig. 13.6
You can change the selections in the Restore dialog box, or just start the restore.

2 Choose the catalog file for the last full backup you did. To see the list of choices, click the Backup Set Catalog button, or highlight it and press the spacebar.

   If the default catalog file is the right one, skip this step.

3 Choose All files on drive C: under the Restore Files button (double-click drive C:, or highlight it and press the spacebar).

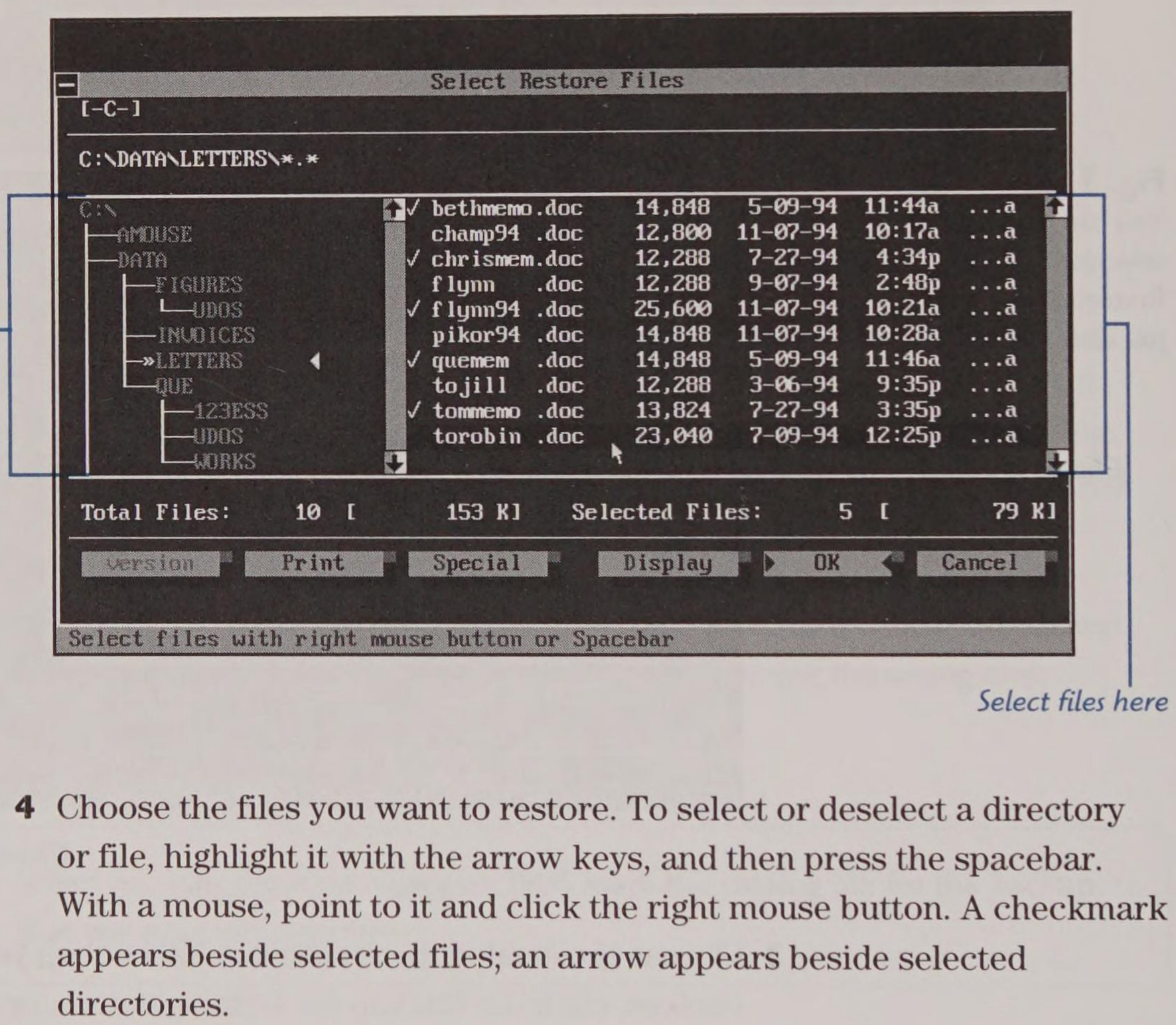
4 Choose Start Restore.

Restoring just a few files or directories

Microsoft Backup lets you pick and choose which files you want to restore:

1. Choose Restore from the main screen. The Restore dialog box opens.
2. Choose the catalog file that has the files or directories you want to restore.
3. Choose the Select Files button at the bottom of the screen. The Select Restore Files screen appears (see fig. 13.7).

Fig. 13.7
You can pick and choose files to restore from anywhere on the backup disk.



4. Choose the files you want to restore. To select or deselect a directory or file, highlight it with the arrow keys, and then press the spacebar. With a mouse, point to it and click the right mouse button. A checkmark appears beside selected files; an arrow appears beside selected directories.
5. Choose OK to go back to the Restore dialog box and then choose Start Restore.

14 Good Things You Can Do for Your Disks

In this chapter:

- Why you should take care of your disks
- How to find out if your disks are healthy
- What's defragmenting? And how do I do it?
- Should I use a disk cache, and if so, how?
- What's SmartDrive?

Just like your car's tires, your computer's disks spin constantly when in use. Eventually, they wear out. But if you take care of them, they can last for years!

You keep your tires in good repair by rotating them regularly, checking for rocks and unusual wear, etc. Disks also require regular maintenance and vigilance in watching for damage. And sometimes disks, like tires, can be repaired rather than replaced.

(Tip)

Take disk care seriously. Check your disks regularly and back up your files regularly. Then you can be sure that no matter what happens to your disks, your data is safe.

So what typically goes wrong with a disk?

Disk problems come in two basic categories:

- problems with the way files are stored on the disk
- problems with the disk itself

Some problems can be fixed—or even prevented—using DOS commands and utility programs. Sort of like rotating the tires on your car to prevent uneven wear. Other problems cause damage to your data no matter what you do, like getting a nail stuck in a tire.

Not to be pessimistic, but here are some of the things that can go wrong with your disks:

- Data can be overlapped on the disk, causing damage to one or more files. Overlapped files are called **cross-linked files**.
- The data from one file can be stored in different places all over the disk, slowing down the amount of time it takes to read the file into memory. Files spread out like that are called **fragmented files**.
- Data that isn't associated with a file may be stored on the disk, wasting space that could be used for other files. Pieces of data like this are called **lost clusters**.
- DOS can accidentally rearrange your directory tree structure, making it difficult or impossible to store or recall stuff in the directories.
- One of the copies of the **file allocation table** (**FAT**) that DOS puts on the disk to keep track of where data is stored might change. DOS doesn't know which FAT is still right, and may have trouble locating files on the disk.
- Viruses can infect the disk and damage files.

{Note} This chapter doesn't cover checking your disks for software viruses. Go to Chapter 15, "Do You Know Enough about Viruses?" for that.

- The disk itself can become damaged so that your computer can't store stuff on it, or read stuff from it. Damaged areas of a disk are called **bad sectors**. If a floppy disk develops bad sectors, you shouldn't use it anymore. Some hard disks might have bad sectors that DOS can work around.

{Note}

If you have a compressed drive, you should be even more vigilant about caring for your disks and drives. Disk problems can affect lots more data on a compressed drive, and can be a lot more difficult to repair. This chapter covers using ScanDisk on a compressed drive; but you should also read Chapter 24, "Cram More Data onto Your Disk with DoubleSpace and DriveSpace," to find out more about these DOS drive compression programs.

Give your disks a quick checkup

DOS makes it easy to check your disks. It comes with two utilities that you can use to quickly find out whether there are any problems and whether or not you can fix them:

- You can use **CHKDSK** (pronounced *check disk*) on non-compressed disks to find out what's doing with your computer's memory as well as with the disk.
- You can use **ScanDisk** (that's the name of the program; the command is SCANDISK) on both compressed and non-compressed disks to perform a thorough checkup and to make repairs.

ScanDisk is new in DOS 6.2. It's more reliable than CHKDSK. CHKDSK itself recommends that you use ScanDisk instead. Still, there are times when CHKDSK is useful. Both CHKDSK and ScanDisk can be used on hard or floppy disks, but you will usually use them for checking your hard disk.

(Tip)

Check your disks regularly—like once a week, or once every ten days.

The following table can help you figure out when to use CHKDSK versus ScanDisk.

ScanDisk	CHKDSK
Can be used on compressed or non-compressed drives	Can only be used on non-compressed drives
Can be relied on to fix common disk problems	Can be used to fix disk problems, but isn't very careful about it
Has an easy-to-use interface, complete with menus and dialog boxes	Must be used from the DOS prompt
Can provide extensive technical information about disks and drives	Displays a simple, straightforward status report

<Caution>

Don't use CHKDSK or ScanDisk from Windows. Fixing disk problems may cause Windows to crash and may cause more serious damage.

Also, even though Microsoft says it works, you probably shouldn't use ScanDisk with drives compressed with a program other than DoubleSpace or DriveSpace—ScanDisk won't know how to deal with it. It will look for problems, but won't fix them. It won't even offer to do a disk scan, and it won't work on any other drive in the same computer.

Checking your hard disk with CHKDSK

To display a report about the status of a non-compressed disk drive C:, just type **chkdsk c:** and press Enter. (If your disk has a different drive designation, like A: or D:, substitute that for C: in the command.) DOS checks the disk and displays a status report on your screen (see fig. 14.1). The status report is simple and straightforward. It lists the way disk space is used and whether there are any problems (see fig. 14.2).

Fig. 14.1
CHKDSK shows no problems on this disk.

How disk space is used

How much disk space is available

How much memory is used

```
C:\>chkdsk c:

Volume DRIVEC      created 03-27-1994 11:23a
Volume Serial Number is 1D6C-776C

  85,018,624 bytes total disk space
   8,140,800 bytes in 9 hidden files
     161,792 bytes in 67 directories
  73,869,312 bytes in 1,380 user files
   2,846,720 bytes available on disk

       2,048 bytes in each allocation unit
      41,513 total allocation units on disk
       1,390 available allocation units on disk

     655,360 total bytes memory
     478,480 bytes free

Instead of using CHKDSK, try using SCANDISK.  SCANDISK can reliably detect
and fix a much wider range of disk problems.  For more information,
type HELP SCANDISK from the command prompt.


C:\>
```

Fig. 14.2
The disk in drive A: has bad sectors; throw it away.

Bad sectors report

```
C:\>chkdsk a:
Volume Serial Number is 3D21-14F6

   1,213,952 bytes total disk space
         512 bytes in 1 hidden files
      24,576 bytes in 2 user files
      15,360 bytes in bad sectors
   1,173,504 bytes available on disk

         512 bytes in each allocation unit
       2,371 total allocation units on disk
       2,292 available allocation units on disk

     655,360 total bytes memory
     478,480 bytes free

Instead of using CHKDSK, try using SCANDISK.  SCANDISK can reliably detect
and fix a much wider range of disk problems.  For more information,
type HELP SCANDISK from the command prompt.


C:\>
```

Q&A

CHKDSK says I have lost clusters. What should I do?

If you have DOS 6.2, use ScanDisk to fix any problems on your disk. If you have a version of DOS earlier than DOS 6.2, you can use CHKDSK with the /F switch, like this: **chkdsk /f**. Be aware, however, that CHKDSK with the /F switch isn't as reliable as ScanDisk and, in some rare cases, may cause more problems than it solves. You may want to invest in a disk utility tool so you don't have to risk using CHKDSK.

Checking your hard disk with ScanDisk

To check your disk with ScanDisk, just type **scandisk c:** (or substitute another drive letter), and press Enter. The ScanDisk program starts and begins scanning the disk, as shown in figure 14.3.

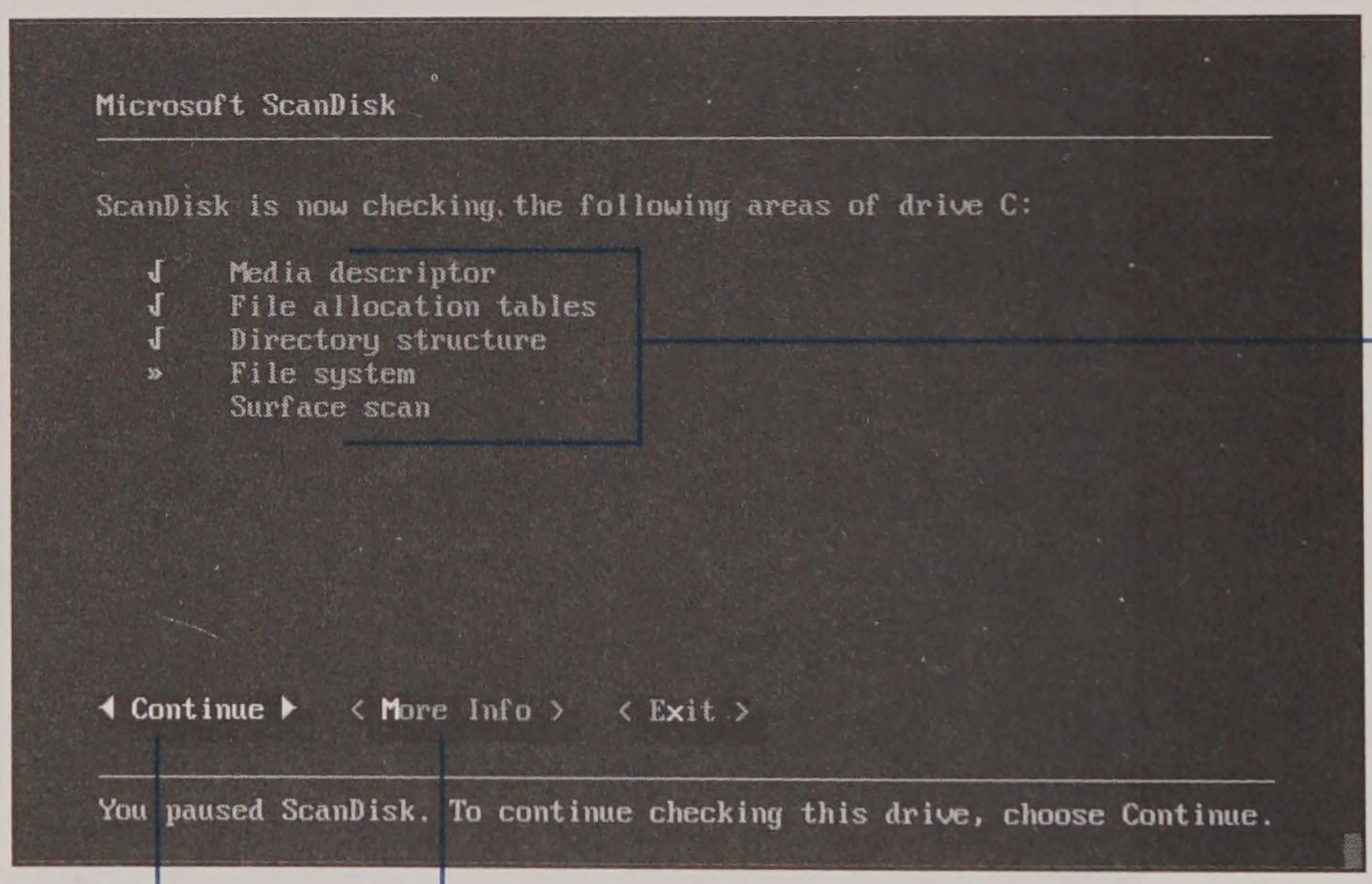


Fig. 14.3
Because ScanDisk is more thorough than CHKDSK, it takes a bit longer to get through its check. If there's more than one screen of information describing the problem, you'll see the word (more) at the bottom right of the Problem Found dialog box. Press PgDn or click the scroll bar to see the next page.

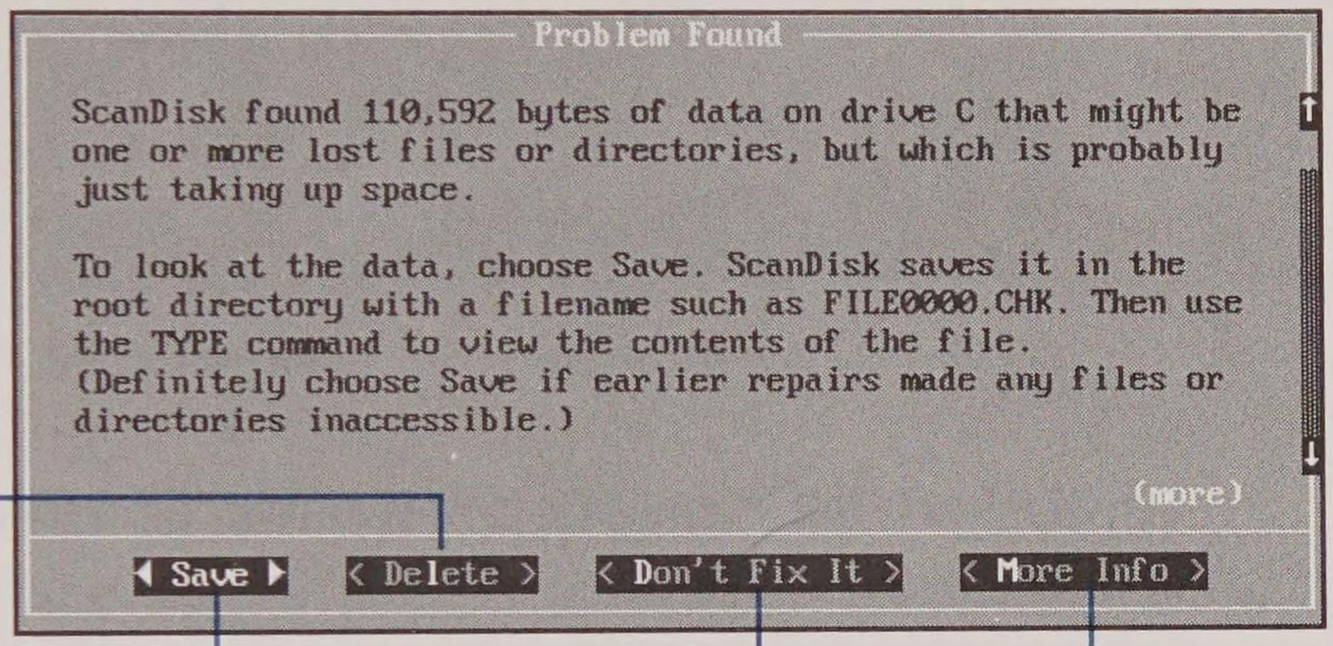
(Tip)

From any ScanDisk screen, you can choose the More Info button to display—you guessed it!—more technical information explaining whatever is already on your screen. You can click the Pause button if you want to stop the scan temporarily.

Here's how ScanDisk works:

1 When it finds a problem, like lost clusters, ScanDisk displays the Problem Found dialog box (see fig. 14.4). You can usually choose to fix the problem or ignore the problem.

Fig. 14.4
ScanDisk gives you lots of options when it finds a problem, like lost clusters on a disk.

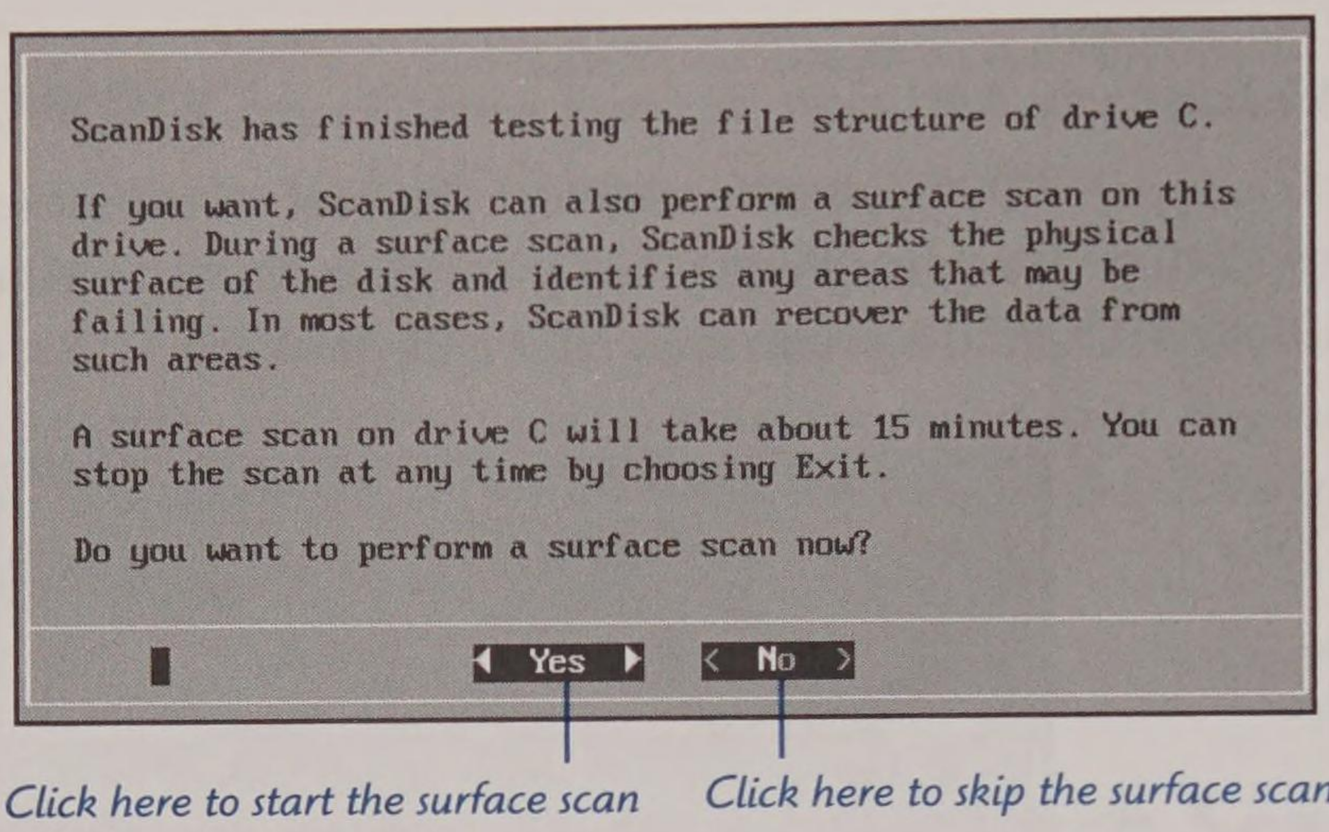


(Tip)

In ScanDisk, you can use a mouse or the keyboard. With a mouse, just click your choice. With the keyboard, press Tab to highlight your choice, and then press Enter.

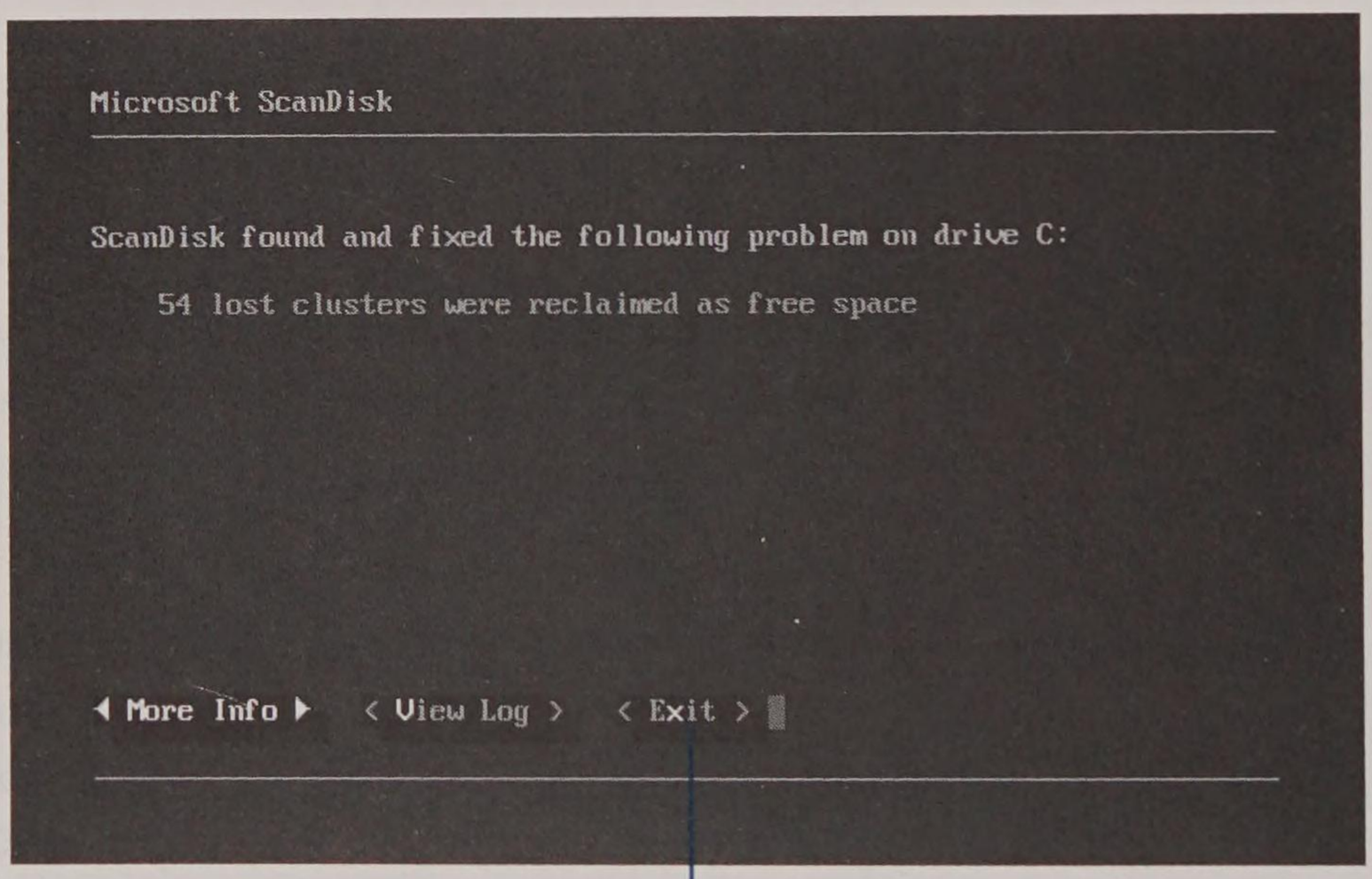
2 ScanDisk then asks if you want to do a surface scan (see fig. 14.5). Choose Yes to check the disk for bad sectors; choose No to skip the surface scan. You probably don't have to do a surface scan every time you run ScanDisk, but once a month would be useful. It takes about fifteen minutes—the bigger the disk, the longer it takes—so you should plan for a time when you don't need your computer.

Fig. 14.5
ScanDisk will also check the disk for bad sectors, or sectors that are failing.



Finally, ScanDisk displays a report screen like the one in figure 14.6, telling you what it found and what it fixed.

Fig. 14.6
ScanDisk tells you what it found and what it fixed.



Somebody said my disk is fragmented. What does that mean?

When DOS stores your files on a disk, it puts them in the first open space it comes to. If the whole file doesn't fit in that space, it stores more in the next open space, and so on and so on until the whole file is stored. A file that is stored in many places on a disk is called **fragmented**.

There are two problems caused by a disk full of fragmented files:

- Your computer will run slower than normal because your disk drive has to spend time looking for all the pieces of the file.
- DOS will have a hard time keeping track of the files, which can result in some misplaced or cross-linked files.

Getting rid of fragmentation is a simple matter of running a defragmenting utility program. DOS comes with one called Defrag.

What's an Undo disk? Should I use one?

If you want to fix a problem that ScanDisk finds, ScanDisk offers you a choice of creating an **Undo disk**. An Undo disk is a record of the problem and how ScanDisk fixes it, stored on a floppy disk. If you don't like the way your computer works after ScanDisk fixes the problem, you can use your Undo disk to go back to the way things were.

There is a very slim possibility that ScanDisk will create more problems than it fixes. In that rare situation, you would want to have an Undo disk. It's a small step to take for peace of mind. To create an Undo disk, follow ScanDisk's instructions. Use a blank, formatted disk. It can fit in either drive A: or drive B:. Remember to label the disk and put it someplace safe.

If you need to use your Undo disk, put it into the correct drive and type **scandisk /undo a:** (or **b:** if the disk is in drive B:) at the DOS prompt.

Plain English, please!

Contiguous describes files stored together in one place—in other words, nonfragmented files. **Discontiguous**, or **noncontiguous**, describes files stored all over the disk—in other words, fragmented files.

Optimize is an overused computer term that, in this context, means to defragment a drive. **Condense** is another term that means to defragment a drive.

How to defragment a hard disk

Defrag is easy to use and kind of fun to watch, although it can take a while.

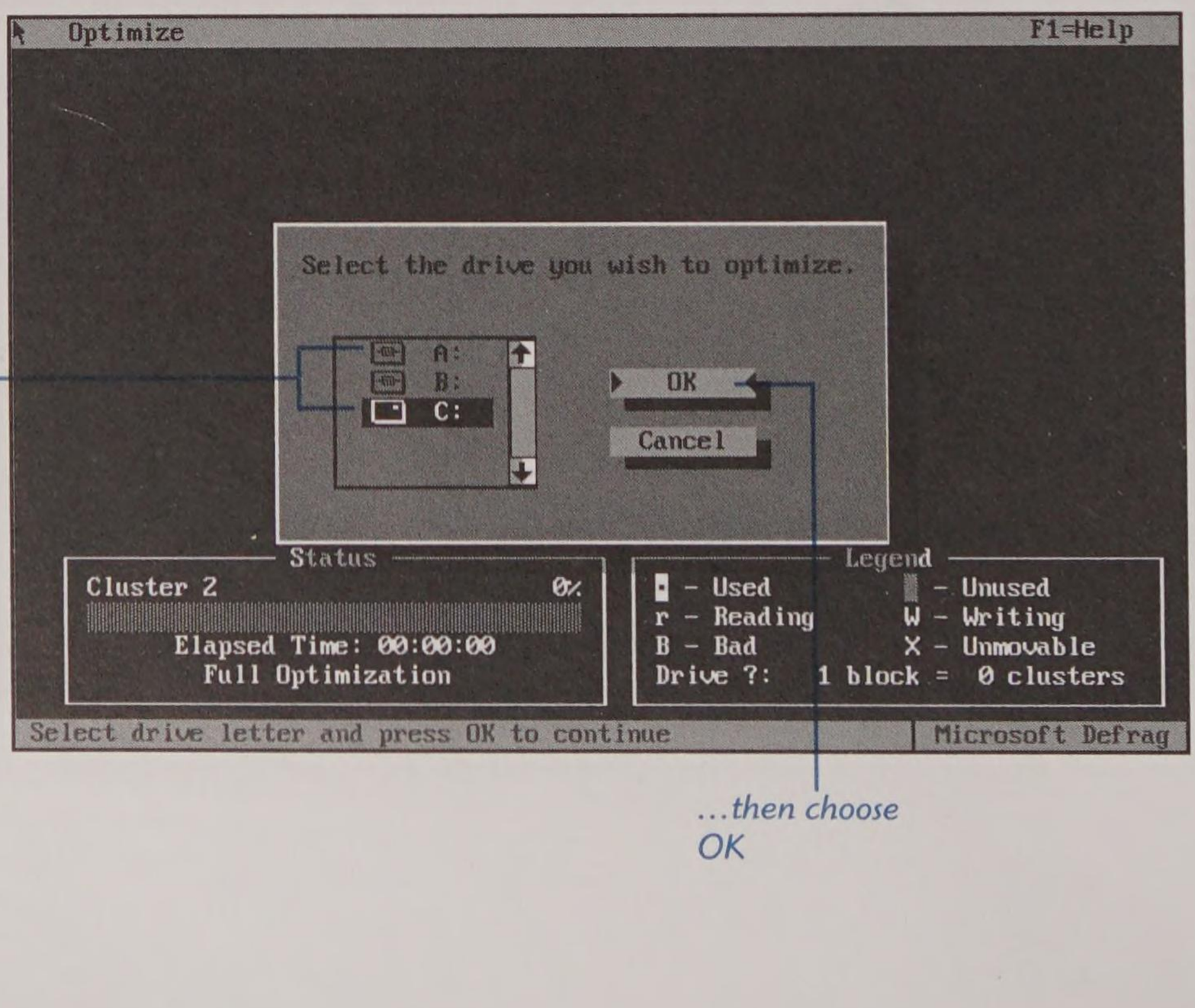
(Tip)

Use your mouse or the keyboard to make choices in Defrag. With a mouse, click your choice. With a keyboard, press Tab to highlight your choices, and then press Enter.

Follow these easy steps to defragment your hard drive C:

1 Type **defrag** and press Enter. The Defrag dialog box appears, like in figure 14.7.

Fig. 14.7
You can use Defrag on any disk in your computer.



2 Choose drive C:. Defrag analyzes your disk to see how spread out the files are, then it proposes the type of defragmentation you should use—either Full Optimization or Unfragment Files Only. The legend at the bottom of the Defrag screen explains what all the little colored boxes are for.

(Tip)

A full optimization is the surest way to defragment your disks completely.

3 Choose Optimize. Defrag starts.

4 When the defragmentation is done, choose OK in the Finished Condensing dialog box shown in figure 14.8.

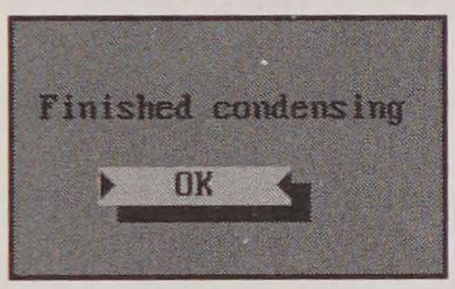


Fig. 14.8
As it defragments the drive, DOS tries to show you what it is doing by moving the little boxes around on your screen. At the end, you can see that your files are more organized than they were when you started.

5 Choose Exit Defrag to go back to DOS.

You can watch while your disk is defragmented, which is pretty cool for a while, but you don't have to do anything until the defragmentation is done, so it's OK to leave the room.

Q&A

I don't understand the difference between Optimize and Configure.

Defrag offers two types of defragmentation:

- Full Optimization defragments all files and moves them all to the front of your disk so your drive can find them quickly.
- Unfragment Files Only defragments all files but doesn't move them to the front of your disk.

The program decides which one you should use, and displays it in that Configure/Optimize dialog box mentioned previously in step 2. When you choose Optimize, Defrag starts working on your disk using the suggested type of defragmentation. If you want to use the other type, choose Configure.

How to defragment a DoubleSpace drive

You can defragment your compressed DoubleSpace drive using the DoubleSpace version of Defrag. Defragmenting a compressed drive is really important, because files that are fragmented on a compressed drive cause much more trouble than files that are fragmented on a non-compressed drive. They slow down your computer, and make it very easy for DOS and DoubleSpace to lose track of where files are stored. (For more data on DoubleSpace and its newer version, DriveSpace, see Chapter 24, "Cram More Data onto Your Disk with DoubleSpace and DriveSpace.")

Here's how to defragment your DoubleSpace drive:

1. Use Defrag to defragment your hard disk.
2. When Defrag is done, type **dblspace /defragment** at the DOS prompt, and press Enter.

DOS and DoubleSpace work together to defragment the files on the compressed drive and then move the compressed drive to one area of the hard disk.

(Tip)

This can take a long time—even hours—depending on the size and condition of your files. Plan to defragment at a time when you won't need your computer for anything else.

Speed up your system with a disk cache

A **disk cache** is a piece of computer memory used to store stuff that is usually stored on a disk. A **disk cache program** is software that makes use of a disk cache. In theory, the computer runs faster if it's using a disk cache program because it doesn't have to wait for the drive to find the data on the disk and read it into memory.

Since version 5.0, DOS comes with a disk cache program called SmartDrive. You can use SmartDrive if your computer has a hard disk or a CD-ROM and extended memory.

What's good about a disk cache?

No matter how fast your computer works, it seems as though it isn't fast enough. One way you can make it work faster is to use a disk cache program.

In addition to making your computer run faster, here are a few other good things about disk cache programs:

- Disk cache programs work behind the scenes, so you rarely have to think about them.
- If you use database applications or humongous spreadsheets, you'll get even better results from a program like SmartDrive. That's because of the nature of these types of files. Computers are generally slower at finding database files and large spreadsheet file data on disk than at finding other types of data.
- Disk cache programs can be used with hard and floppy disks, and sometimes with CD-ROMs as well. The MS-DOS 6.2 version of SmartDrive, for example, can work with CD-ROM data.

Okay, so what's the down side?

Some disk cache programs—including SmartDrive up until MS-DOS 6.2—actually put your data at risk. The programs hold files in memory, so—unless you shut off the write cache—if you shut off your computer suddenly, poof! the data's gone.

Luckily, the MS-DOS 6.2 version of SmartDrive is set up to write all new data to your hard drive immediately. It only keeps data it has read from your hard drive in memory. If you lose power suddenly, you don't lose the new data.

How to use SmartDrive

You don't have to do anything to use SmartDrive. If you have a hard disk and extended memory, DOS automatically sets up your computer during installation to use SmartDrive.

To set up your computer for SmartDrive, DOS adds a command statement to your AUTOEXEC.BAT file (see fig. 14.9) and may add one to your CONFIG.SYS file (see fig. 14.10). If you don't remember what CONFIG.SYS and AUTOEXEC.BAT are, go back to Chapter 10, "What Happens When You Start Your Computer."

Fig. 14.9
DOS automatically adds a command to your AUTOEXEC.BAT file to load SmartDrive whenever you start your computer.

```
C:\>type autoexec.bat
C:\DOS\SMARTDRV.EXE
C:\DOS\SHARE.EXE
@ECHO OFF
PROMPT $p$g
PATH C:\DOS;C:\WINDOWS;C:\UTILS;C:\WORD
SET TEMP=C:\DOS
SET WIN$=C:\WINDOWS
C:\AMOUSE\AMOUSE
C:\UTILS\SAVE /CG /A
CLS

C:\>
```

Here's the command to load SmartDrive

Fig. 14.10
DOS might also add this device statement to your CONFIG.SYS file.

```
C:\>type config.sys
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\EMM386.EXE NOEMS
DEVICE=C:\DOS\SMARTDRV.EXE/DOUBLE_BUFFER
BUFFERS=20,0
FILES=50
STACKS=9,256
LASTDRIVE=E
FCBS=16,0
DEVICE=C:\DOS\SETVER.EXE
DEVICE=C:\MOUSE.SYS
SHELL=C:\DOS\COMMAND.COM C:\DOS\  /p

C:\>
```

Here's the SmartDrive device command statement

Using SmartDrive 6.2

If you have DOS 6.2, SmartDrive automatically runs in **read-caching mode**, which means only stuff that has already been stored on disk is held in memory. This keeps you from losing data during a power outage or when your dog bumps into the computer's On/Off switch.

If you are feeling lucky, and want to make your PC run even faster, you can switch to **write-caching mode**. In write-caching mode, SmartDrive not only uses read-caching to read data into memory, but it holds new information in memory until disk activity slows down. It may not write new information to disk for a few minutes, which leaves you vulnerable to sudden shutdowns.

If you want to start SmartDrive in write-caching mode, type **smartdrv c+** at the DOS prompt.

You can even use SmartDrive with Windows

SmartDrive can help Windows programs run faster, if it is set up right. It works pretty much the same way with Windows programs as it does with DOS programs—by holding information in memory until the program needs it (the information, not the memory).

One difference is that the size of the disk cache is smaller if Windows is running than if just DOS is running. That's because Windows needs more memory just to run.

DOS allots a preset amount of memory for SmartDrive to use as a disk cache, depending on how much extended memory you have installed in your computer. Typically, on a system with 2 MB of memory, SmartDrive uses 1 MB for a disk cache while you are running DOS applications. When you start Windows, the size of the cache is decreased by 256 KB.

15

Do You Know Enough about Viruses?

It's a sad commentary on the world when a nice friendly computer book has to dedicate a couple of chapters to killer computer programs!

In this chapter:

- What is a computer virus?
- What viruses do to files
- How viruses get around
- There's more than one kind of virus, and they all have complications
- What are your chances of catching something?

Unfortunately viruses exist, and they spread, and most large offices in North America have already had some experience with them. This chapter explains what viruses are, where they come from, and how you might get one. The next chapter (Chapter 16, "Safe Computing—How to Protect Your PC from Viruses") shows you how to protect your PC and your data from a virus' harmful effects.

So what's a virus?

The word **virus** is used today to describe any of a number of computer programs that are written strictly for the purpose of damaging data or hardware. Often they *hide* inside other programs, waiting for some special event that will trigger their release. That's when they start doing their dirty work.

You might begin experiencing annoying little glitches in your machine—a couple of files that were there yesterday seem to have disappeared, or perhaps the machine has difficulty recognizing the presence of drives *that you can see are there*. To be fair, this doesn't mean that your PC is infected with anything. User error or loose cables can produce exactly the same symptoms and are more common than virus attacks. Still, it pays to be safe and to know how to protect yourself.

A true virus is a computer program that tries to copy itself from disk to disk, injecting itself into sensitive files. For the programmer who writes it, a virus is a challenging and possibly humorous exercise in logic. For the people who are unlucky enough to catch it, a virus is an expensive and annoying problem. For professional **virus chasers**, a virus is a profitable commodity. Isolating, classifying, and cleaning them up generates millions of dollars in fees every year.

Viruses live in your computer's memory. Since memory is always erased every time you turn your PC off, that effectively kills the virus—at least until you wake it up by poking the place on the disk where the virus settled down. Then it's back in memory and you're in hot water again.

What does the virus do?

At the time of this writing, there are about 3,000 known different viruses. Some of them don't do anything at all. They are strictly self-duplicating programs written by some nut. Others will corrupt or destroy every byte of data on your hard disk. The vast majority fall somewhere in the middle of the two extremes.

{Note}

Some viruses activate at certain times of the year and lie dormant the rest of the time. The Joshi virus (they all have names) springs to life every January 5th. The system will simply lock up until you type "Happy Birthday Joshi" at the keyboard. Then you're okay for another year. Hey Joshi, lots of people are looking for you.

More likely, certain files, or pieces of those files, will disappear entirely. Programs that worked before will no longer run, displaying error messages instead. More and more files become corrupted on the infected disk until there is very little usable information left. Some virus programs will simply lock up the computer and display some kind of message on the screen. Some are a little more imaginative and occasionally send some kind of animated character running across your screen. Then your system returns to normal for a while. Figure 15.1 shows the kind of effect a virus can have on your system. Notice how the text looks fine in the upper version—and what happened to the lower version!

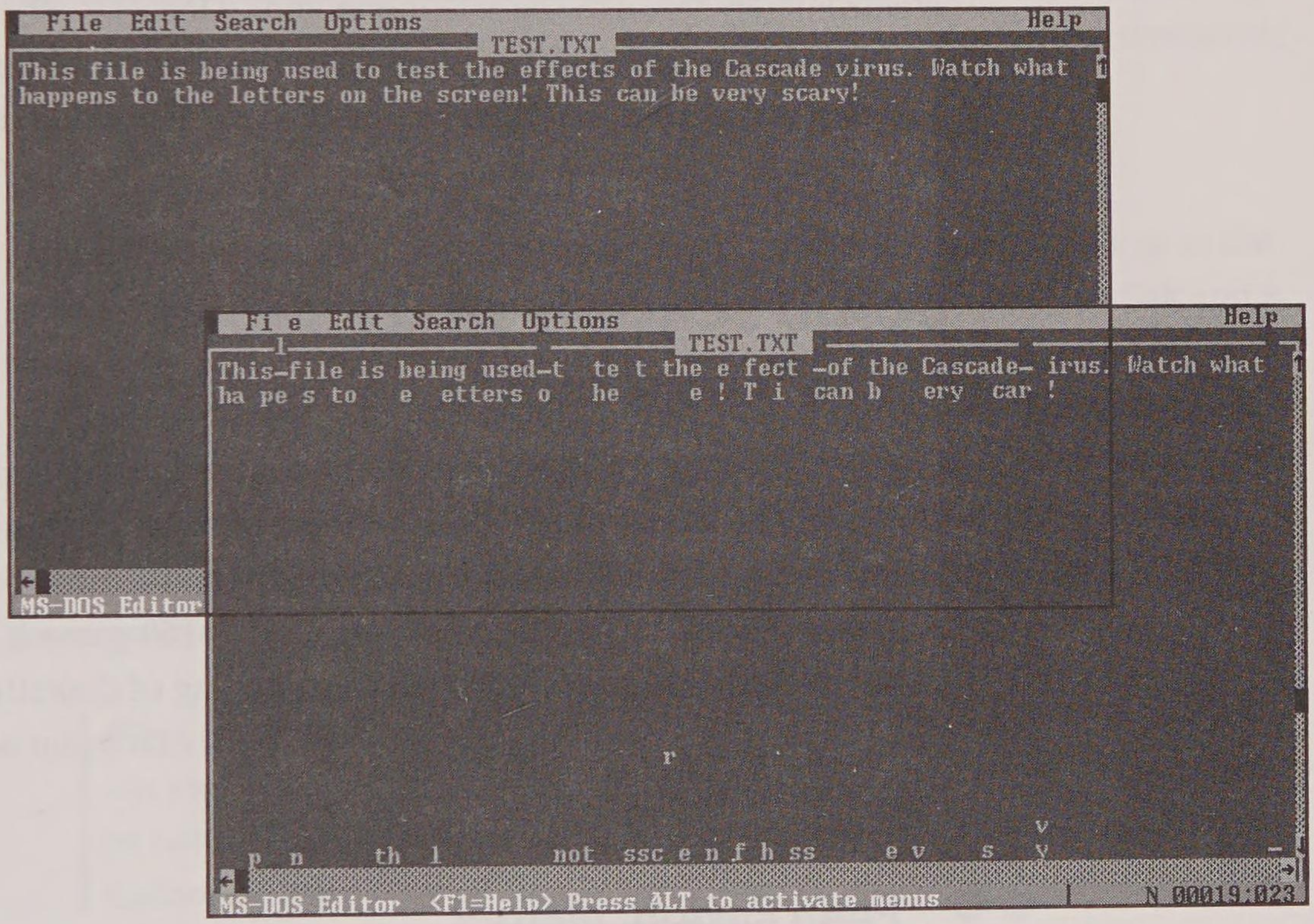


Fig. 15.1
The Cascade virus will sit in your computer's memory and then unexpectedly cause characters to drop to the bottom of the screen for no reason.

How do you become infected?

Most PCs become infected by reading a diskette that has been accidentally infected by another machine. The diskette may contain an infected program file of some kind, or the virus may be sitting in a special portion of the diskette called the **boot sector**. This is the section of the disk where DOS would live if the diskette was bootable. By accidentally leaving the diskette in

drive A: and turning on the machine, the virus is read into RAM memory and begins infecting files on the hard disk. Getting that `Non-system disk or disk error` message used to mean that you forgot to remove a floppy from the drive. Today, it may mean hours of headaches if the diskette wasn't clean.

What about downloading files? Isn't that safe either?

The modem has become an unwitting tool in the spread of virus programs. As electronic bulletin board systems spring up in every city, people share files electronically through the telephone lines. Occasionally, an innocent user will see a note saying, "This program is the funniest thing since Pee Wee Herman and you should take a copy of it." The poor soul **downloads** the file, but when he runs it—Wham!

Some schools share more than knowledge

I hate to say it, but schools are common breeding grounds for file infection. Computer labs are not necessarily being used to write new viruses (though they may be), but high-school students do tend to engage more often in software **piracy**. "I'll give you a copy of my $150 game if you give me a copy of your $200 word processor." All this copying of diskettes can spread a virus like wildfire and certainly keeps the school's computer administrators on their toes as well.

Plain English, please!

Piracy is a term used when people make copies of computer software. Most programs are protected by copyright—just like books. It is illegal to make photocopies of books, and it is equally illegal (but much easier) to make copies of software programs.

File infectors

By far, the majority of all viruses are file infectors. They weasel their way into COM and EXE files, and they especially like the DOS files that get loaded whenever the system is turned on. That way they get up and running again as soon as possible. Most file infectors are constantly on the lookout for unsuspecting programs and will try to attach themselves to the executable files every chance they get.

Even if the virus is **benign**—meaning it doesn't actually damage anything—file infectors are a problem because they take up space in your system. Every file they touch becomes larger and the amount of RAM memory they use up while they're working will no longer be available to you for productive work.

Boot sector viruses

Of the 3,000 or so viruses that are known, only about 100 like to sleep in the boot sector of a disk. That's because this is a sensitive area of the disk and a virus must be very sneaky indeed to get into here and still allow the PC to boot. What fun would virus-writing be if it killed everything right away? (It wouldn't even have a chance to infect anything else.) It would be much more sophisticated if it infiltrated the bootable areas of your hard disk, spent its time infecting the same areas on floppy disks, and waited for the special moment to strike.

{Note}

More paranoid readers might think that this sounds like a foreign plot to bring our electronics-oriented society to its knees. I assure you it isn't. It is interesting to note though, that some of the best viruses ever written have come out of Eastern Europe.

Boot sector viruses have given rise to a new, nasty type of virus called the **stealth virus**. Besides doing their usual dirty tricks, they also watch for anti-virus software and get out of the way when one comes around snooping. (Anti-virus products are discussed in Chapter 16, "Safe Computing—How to Protect Your PC from Viruses.") Stealth viruses have the upper hand since they're in the boot sector and automatically load into memory as soon as the PC is turned on.

When you get a virus, what happens?

Viruses are actually categorized by what they do and how they do it. (I told you that chasing viruses was a big business.) Think of this section as health education for your PC. You have to know what you can catch before you'll be scared enough to take preventive measures seriously.

Self-replicating viruses

These are kind of clever actually, because of the techniques they use to infect any system they touch. Let's say you are handed a floppy diskette with a program on it, and told to copy the file onto your hard disk. So far so good. When you actually *run* the program though, it turns out to be secretly infected and the virus program loads itself into memory. The chances are that you don't even know you have a virus yet, but it's still sitting there in memory just the same.

You begin your normal work day, loading various applications and copying files to floppy disks. Little do you know that every time you load a program into memory, its files on the hard disk become infected by the virus. Every time you copy a file to a floppy diskette, a little piece of the virus goes with it so you can share it with a friend.

{Note}

In the DOS world, most viruses are transferred within **executable code**—that means program files, not data files. Most program files on a PC carry the extensions COM, EXE, or SYS. Systems that run Windows have two more types of executable files that carry the extensions DLL and PIF.

What this self-replicating does depends on the *second half* of the program. The first half is only responsible for finding a way to copy itself. The second half decides what damage it should do. Believe it or not, there are people who capture viruses, change the second half, and then release the virus into the world again. This new virus is called a **variant strain** of the original.

The people who write these variants believe that they have created a brand-new virus. Depending on how *creative* or *vindictive* these mad scientists are, the variant may mess up your screen, erase your files, or do nothing at all.

The point is that any time a virus is modified, it becomes harder to detect. One can't help but imagine some frustrated programmer in his basement laughing insanely and yelling, "It's alive!"

Trojan horse viruses

Just like the original Trojan horse, this is a program that looks pretty cool from the outside, but hides an evil power within it. A Trojan does not actually have to be *viral* to be dangerous. Any program that boasts about how useful it is, but secretly erases all your data, can be classified as a Trojan. The only good thing about this is that the Trojan may get erased at the same time. You're still stuck with an empty hard disk unfortunately, so you better go find those backups. You do have backups, don't you? Better read Chapters 12, "Disaster Prevention: Back Up! Back Up! Back Up!," and 13, "Restoring the Backup (and You Will)," if you don't.

This Trojan horse fooled almost everybody!

One of the most interesting Trojans popped up a few years ago. A certain company that specialized in **virus-detection software** was known for constantly updating their program to keep up with all the new viruses. (That's good!) Unfortunately, some wiseacre wrote a Trojan-horse virus that *looked* like a new version of this anti-virus software. (That's bad!) Everyone who thought they were taking preventive measures on their PCs were actually infecting all their files. The company quickly came out with a new version of their software capable of detecting the Trojan.

Logic bomb viruses

These are some of the sneakiest viruses because they don't show themselves until a certain event, or combination of events, occurs. In the meantime, they've copied themselves all over the PC network at the office and onto the hard disks of everyone you ever knew. Joshi (mentioned in a previous Note) is a logic bomb because it only goes off every January 5th. Others do their dirty work after the PC has been rebooted ten times, or when the Print Screen key is pressed.

The most common viruses

Tough question. Hundreds of thousands of infections are reported every year and probably an equal or greater number are not reported at all, but are dealt with internally. The following table lists the top 5 reported infections, beginning with the most common.

Name	Symptoms
Jerusalem	Leaves a black hole or box in one corner of the screen, erases program files, slows down the PC. This virus is the basis for over 50 other known viruses.
Cascade	Displayed characters just drop to the bottom of the screen randomly. May cause the PC to reboot for no reason.
Brain	Changes the volume label of the hard disk to read, "Brain."
Ping-Pong	A character starts bouncing around on the screen, like in the old Pong video games.
Stoned	The message `Your PC is now stoned` pops up randomly when the system boots.

Despite the fact that this list shows the "Big 5," there are about 75 different viruses that one could classify as "common." They are widespread mostly because people don't know enough about how to protect themselves. Read the next chapter to find out what you can do.

What are my chances of catching something?

That depends on the type of user you are, who your friends are (know any long-haired, pizza-eating, trench coat-wearing people with foreign accents?), the kind of company you work for, and whether or not they have an anti-viral policy in place. If you sit in a little room with your computer, never use a floppy disk, never use a modem, and are not connected to a network, then you're probably alright. (Unless, of course, you get infected by a brand new software program right out of the box. This has happened, but luckily, it's extremely rare.)

(Tip)

Inquire at work about your company's policy against viruses. If they don't have one, make the suggestion. You can find out more about protection methods by contacting:

The National Computer Security Association (NCSA)
10 S. Courthouse Ave.
Carlisle, PA 17013

The fact is, there's a small chance of catching something the minute you communicate with the outside world. Get yourself a good program that scans for viruses and use it every time someone hands you a floppy diskette. If you use a modem and want to **surf the net**, deal with only the larger, commercial bulletin boards (such as CompuServe or America Online) and scan *anything* you download.

If you develop a few good habits and educate the people you deal with, maybe the only experience you'll ever have with viruses will be hearing about how somebody down the hall lost everything.

16 Safe Computing—How to Protect Your PC from Viruses

In this chapter:

- How do I protect myself against computer viruses?
- If your disk gets infected, you still might be able to save some stuff
- Virus-scanning software that can save your computer
- How do I use a virus scanner?

Unfortunately, as long as there are idiots out there with a little programming skill, there will always be computer viruses.

At this point in time, there seems to be a competition going on between the virus writers and the virus scanners. As soon as virus scanners are adjusted to detect the latest infections, a new virus gets released and the cycle starts again.

Who suffers as a result? All of us, because we have to take preventive measures that cost money. How much money? Well, that depends on the route (and the degree of protection) you choose to take. No matter how you slice it, any preventive measure just has to be cheaper than the consequences.

Anti-virus strategies

Wouldn't it be wonderful if all computer viruses could be rendered extinct? They would fade into memory like polio and the Black Plague. Well, since we can't eradicate all the computer viruses, we have to learn how to stop them. Here's some useful tips that are either no-cost or very, very cheap. You'd be surprised how easy they are, and once you start, they might even become good habits.

Trust no one

This doesn't mean it's okay to be rude. It simply means that even your best friends can be handing you an infected floppy disk without them knowing it. Politely tell people that you have a policy of scanning *every* floppy diskette that crosses your desk. (Virus scanners are discussed in a minute.) Then, scan the floppy disk before working with it. The worst that can happen is that your friends and co-workers will ask for help scanning their own stuff. Hey! You're a guru!

If every computer user regularly scanned every diskette he or she ever received, it would be like a vaccination program for the whole world. Most viruses could be wiped out in a matter of hours.

An old friend of mine once asked me if she could install a software program on my machine so she could practice using it. She also knew about my scanning policy and *suggested to me* that I scan her disks. Since she was a good friend, I would have let it go, but I wanted to set a good example. (The set of eight diskettes, by the way, were obviously copies of the original disks. For more detail, check out the section about software piracy.) I scanned the first seven with no positive results, but the last one sounded alarms all over my PC. The eighth diskette was infected with the Brain virus.

Let this be a lesson to you. When you compute with someone, you compute with everyone they've ever computed with. (I apologize profusely for that obvious line and will try to avoid any similar references for the rest of the chapter.)

Deal with reputable bulletin boards

You have a modem, some communications software, and a few phone numbers you got from a friend. Watch your step from here on in. In any city, there are good BBSes and bad. The good ones check you out pretty thoroughly before allowing you any real access. (That way, they know who you are if you send them a buggy file.) The bad ones let anybody on and probably have available "free" copies of programs that are normally expensive.

If you can afford it, use the really big on-line systems. CompuServe, America Online, and Delphi are way more professional than a bulletin board system operated by some kid in his basement.

Don't think that I'm being unnecessarily hard on the little guy here. For every bad BBS, there are probably two or more good ones run by serious and responsible hobbyists.

(Tip)

As a rule of thumb, *any* file you download into your system should be scanned before you try to use it. This applies even if you deal with large, reputable bulletin boards. Nobody's perfect.

Don't be a software pirate

The copyright laws concerning software are just like those concerning the printed word. Nobody would even think of photocopying every page of a twenty-dollar book, but give them a five-hundred dollar software program and they think it's okay to give copies to everyone who has a PC.

Where do these "pirate" copies come from? Somebody gave a copy to two friends, who told two friends, who told two friends and so on, and so on. If you're lucky, only one person in the pyramid had an infected diskette, so you only get one virus at a time. Buying your software legally gives you the advantage of clean diskettes (probably, but scan them anyway), cheaper upgrades to new versions, support right from the manufacturer, and a good feeling deep down inside. As an added bonus, it will also keep you out of jail. Remember that copying software is a crime.

Keep your anti-virus software up to date

Any program that you use to scan for viruses is only as good as the day it was written. Since then, new viruses have certainly been created and distributed to users around the world. Most estimates say that between five and ten new viruses are written *daily*.

Most viruses have distinct *signatures* that allow them to be discovered by software. If the latest viruses aren't recognized by your scanner, its effectiveness is greatly reduced.

Use memory-resident anti-virus programs

Most anti-virus programs also include a special program that you can load into your computer's memory, and then it just sits there, looking for signs of virus-like disk activity. If your work requires you to send and receive a lot of floppy diskettes, this is a good way to protect your machine automatically. Once loaded, the program just runs by itself and monitors the system.

As with virus-scanners though, the **memory-resident** program is only as good as the day it was written. These too should be updated occasionally to guarantee that your PC is receiving the proper protection.

Plain English, please!

A **memory resident** program is special software that runs invisibly in the background of electronic memory. (Think of it as the computer equivalent of a post-hypnotic suggestion.) Often, this type of program is used for "pop-up" utilities like calculators or electronic phone books that can be called to the screen by pressing a couple of keys.

Emergency disks and backups

In Chapter 6, "DOS Stuff You Can Do with Disks," you learned how to prepare a bootable floppy diskette that contains enough DOS files to start your PC. In Chapter 12, "Disaster Prevention: Back Up! Back Up! Back Up!," you learned how to make backup copies of your files. These two techniques are your life savers in case you're ever unlucky enough to be on the receiving end of an infected diskette.

If it's not write-protected, it can get infected

At the first suspicion of a virus, the computer should be turned off and rebooted with a clean, bootable floppy diskette. This way you know that you are not loading the virus back into memory again, because you are not accessing the hard disk. How do you know that your floppy isn't going to become infected? Make sure that it's write-protected! Chapter 6, "DOS Stuff You Can Do with Disks," shows you how to write-protect a floppy disk.

(Tip)

Occasionally, disk drives may become sticky or broken with age and the write-protect feature may not work properly. Whether the floppy is protected or not makes no difference if your drive can't switch back and forth. Some viruses take advantage of this and write to the disk anyway.

Test your drives by enabling write-protection on a floppy and then trying to copy a file onto it. As long as you get an error message, you know your drive is fine! If the copy really works, have your machine serviced.

Your bootable floppy disk should have a copy of a good virus-scanning program on it so you can scan the files on your hard disk. If everything comes up clean, then you can just reboot from your hard disk and put the scanner away for another day. If it detects any viruses in your hard disk's files, then congratulate yourself for write-protecting the floppy and follow the scanner's instructions for wiping out the hazardous programs.

When to throw in the towel

Depending on the scanning program you use and the virus it detects, you might be able to completely eradicate the virus with no trouble at all. Often, your files can all be returned to normal by answering Yes when the scanner asks if it should clean up your disk. Some viruses require that the infected files be deleted. This is a bit more drastic, but the deleted files can still be restored from your backups. Someday, though, you may come across a bug that doesn't wipe out so easily.

(Tip)

If you ever do detect a virus on your system, don't be satisfied with cleaning up your own hard disk. The virus came from somewhere (by floppy?) and probably went somewhere else before you detected it. Check *all* your floppy disks and tell your friends and co-workers to scan their equipment as well. Otherwise, you'll be back in the same boat again before long.

Depending on the degree of infection and what kind of damage you've already sustained, it's possible that the directories, boot sectors, and other sensitive areas of your hard disk will have to be recreated. This should be left to people with the correct technical expertise. Your scanning program will most likely tell you how bad things are and what steps should be followed to correct it. If any of the operations seem too complicated, don't be a hero. Call in a real guru.

Aren't you glad you use backups?

The best defense against any kind of virus attack is to have a complete set of recent backups of your files. Your programs all come on floppy disks anyway and can simply be reinstalled, but your data represents hundreds of hours of work. If the worst happens and your entire hard disk has to be erased and reloaded, you'll be glad you thought to back up regularly.

I know what you're thinking. Suppose the virus got backed up with all the other files. What happens then? Simple, you go back to your *previous* set of backups. A proper backup policy maintains two or three sets of backups from several weeks previous before the oldest copy is recycled again. That way, if restoring a backup just reinfects your disk, you can go back a week earlier and try again.

The "big five" virus scanners

Although there are literally hundreds of different software packages on the market, a few have proven to be the most popular. Some you buy. One is free (which accounts for its popularity). Some are **shareware** that you can download from any good bulletin board.

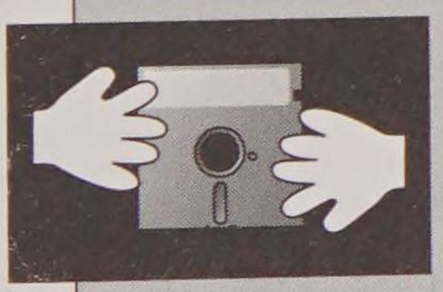
Microsoft Anti-Virus

Anyone who uses at least MS-DOS version 6.0 receives a free copy of **Microsoft Anti-Virus** (also called **MSAV** for the command that runs the program—pronounce it *EM-save*). MSAV is capable of scanning for the most common viruses, and will clean them out as well. It also includes a memory-resident program called **VSAFE** that will keep a lookout for suspicious activities in your PC.

(Tip)

When MS-DOS 6 and higher is installed on your system, it looks to see if you have a copy of Windows. If so, you may not get the DOS version of MSAV, but a Windows version instead. If typing MSAV at the DOS prompt creates a Bad `command or file name` error, load Windows, start File Manager, and look in the Tools menu for an anti-virus option.

What's shareware?



Shareware is a method of distributing software that allows smaller companies to put their wares on the market at low cost. You are *supposed* to distribute the software to your friends and its okay to get copies of it from electronic bulletin boards.

You are then allowed to use the software for a short **evaluation period**. If you like it and want to continue using it, you're supposed to send the author a licensing fee that can be between $5 and $50. Shareware is not **freeware**. Help encourage the entrepreneurial spirit and send the poor guy a few bucks.

Contrary to popular belief, shareware isn't a very common source for virus infections. In fact, there's even an Association of Shareware Professionals that helps young companies distribute their products in a virus-proof package.

MSAV is not nearly as effective at detecting viruses as some of the other following products mentioned. Still, the price is right and any protection is better than no protection at all.

Central Point Anti-Virus

Central Point Software has been around for many years and made a name for itself selling PC Tools, a data recovery and disk management program. A few years ago, they added their own anti-virus product to their line and have updated it several times since then to keep up with developments in the virus world.

Central Point eventually licensed some versions of its products to Microsoft, which is how MSAV became available with MS-DOS. Central Point's CPAV software is still sold in computer stores however, and is actually better than the free stuff that comes with MS-DOS.

Norton Anti-Virus

Like Central Point, Peter Norton made his name years ago with specialist tools that were designed to protect disks and recover damaged data. The Norton Utilities have sold millions of copies and it was only natural for the company to come out with an anti-virus program. It is very similar to the previously mentioned products, in that it is easy to use and can clean out most of the infections it discovers. On the effectiveness scale, it's about the same as Central Point Anti-Virus.

John McAfee's Viruscan

Like the baby food company who said, "Babies are our only business," McAfee and his merry band are dedicated to the search for viruses. The **Viruscan** program (sometimes just called **Scan**) has been updated over 100 times since its first release and the latest versions can consistently catch more than 90% of all known infectors. (Nobody can achieve 100% efficiency because of new viruses being written every day.)

Viruscan comes with a sister program called **Clean** that is used to wipe out infections discovered by the scanner. It also has a memory-resident program called **VShield** that passively monitors your system. The DOS versions of these packages are not very pretty to look at, but are extremely effective (see what I mean in figure 16.1). There is a Windows version available as well, which is easier to use.

```
C:\UTIL\SCAN>scan c:
SCAN 9.28 V116 Copyright 1989-94 by McAfee Associates. (408) 988-3832
Scanning memory for critical viruses.
Scanning for known viruses.

Scanning Volume: CONFUSING

Disk C: contains 154 directories and 3713 files.

 No viruses found.


SCAN 9.28 V116 Copyright 1989-94 by McAfee Associates. (408) 988-3832

     This McAFEE(TM) software  may  not be used by a business, government
     agency or institution without  payment of  a negotiated license fee.
     To negotiate a license fee contact McAfee Associates (408) 988-3832.
     All use of  this software  is  conditioned upon  compliance with the
     license terms set forth in the LICENSE.DOC file.


      Copyright (c) McAfee Associates 1989-1994. All Rights Reserved.


C:\UTIL\SCAN>
```

Fig. 16.1
McAfee's Viruscan program loads from the DOS prompt by typing **scan c:** (or whatever drive you want). It completed this large scan in about 2 minutes.

The best thing about McAfee's Viruscan is that it is distributed as shareware and is readily available on most good BBSes. Licensing fees for individuals are $25 per year for each module (that's $75 for all three), which includes updates. Paying the fee also guarantees that the company can continue its excellent work.

F-Prot Professional

Despite its really weird name, this package ranks right up there with McAfee for effectiveness. It's written and updated by a professor in Iceland who has dedicated himself to the battle against viruses. It has an easier **interface** than the DOS version of Viruscan because you get to select from menus (for an example, check out fig. 16.2).

> ***Plain English, please!***
>
> An **interface** is the way you communicate with your computer and its software. For example, DOS has a **character interface** because you type commands and follow a syntax. Some programs have a **menu interface** where you pick commands from a list on the screen. Others, like Windows, combine the menus with little pictures that you can click with a mouse. Then, it's called a **graphical interface**.

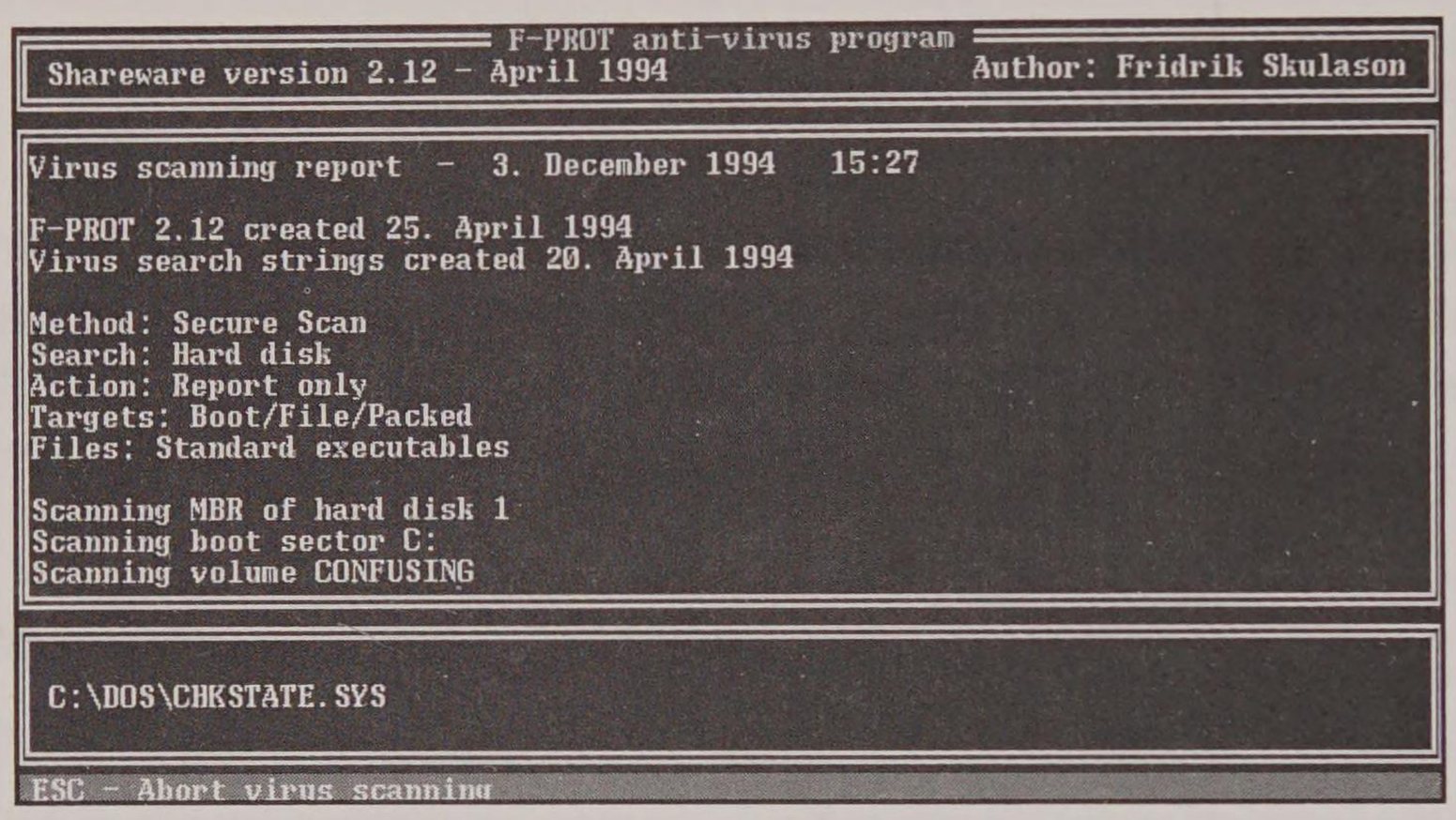


Fig. 16.2
F-Prot can find and clean over 90% of all viruses and doesn't cost anything for private individuals.

F-Prot is distributed as shareware and is free to private users in their own homes. Companies have to pay a licensing fee, based on the number of users and stuff like that.

How to scan a disk with Microsoft Anti-Virus

This package is available to anyone running MS-DOS 6.0 or higher, so chances are that you already have some sort of virus protection available to you. To load Microsoft Anti-Virus, at the C: prompt, type:

msav

Anti-Virus will load, and after a few seconds, your screen will look like the one shown in figure 16.3. The screen has a menu of five options that you can point to with the arrow keys. Pressing Enter selects the highlighted option. The bottom of the screen lists what function keys are available (F1-F8) to perform common operations with the press of a single key.

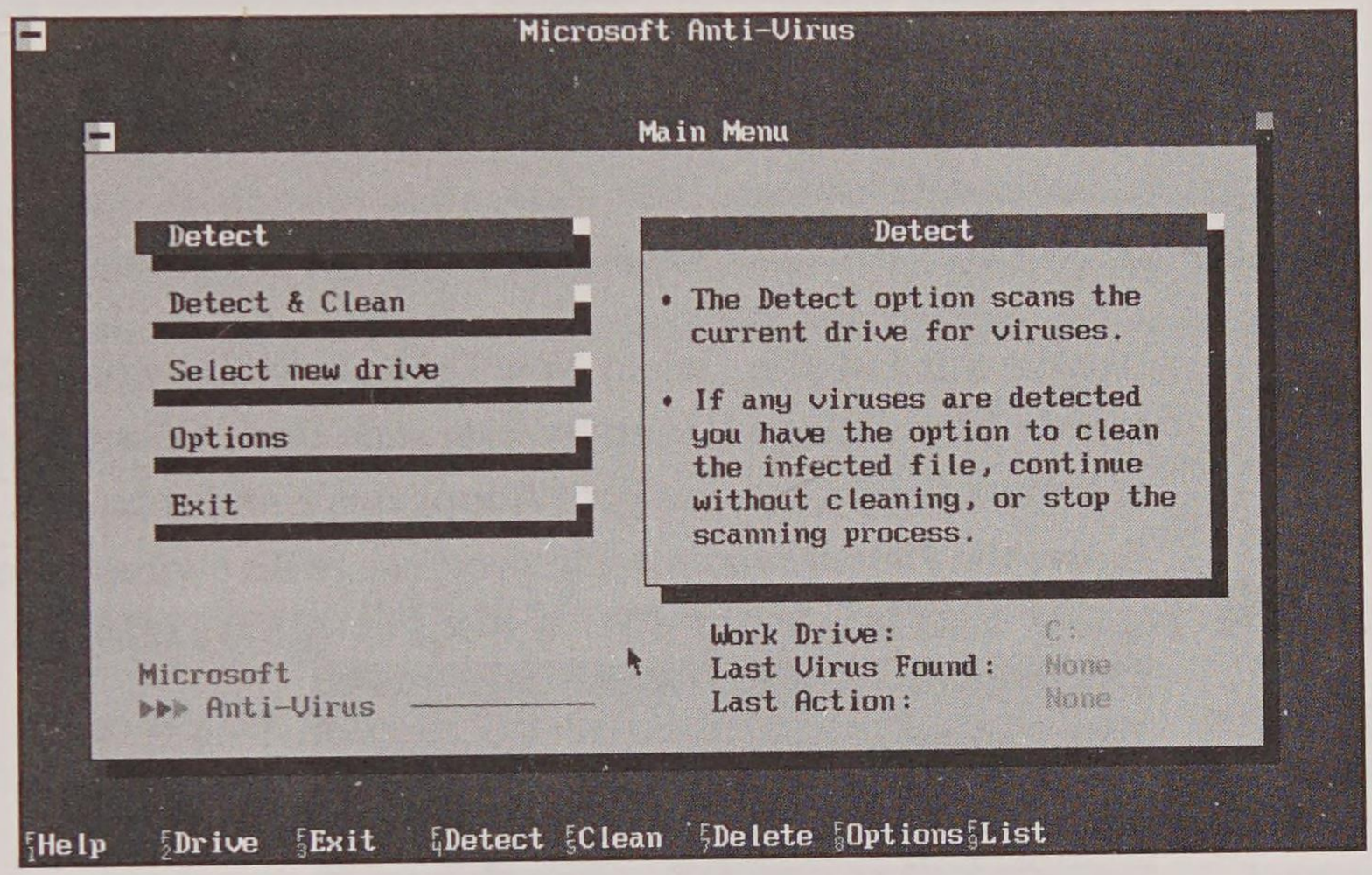


Fig. 16.3
The opening screen of MSAV is easy to understand. The window on the right offers an explanation for each of the five selections on the left.

There are two ways to start the scan procedure. You can select Detect, or Detect and Clean. Choosing the first option causes the program to begin scanning your disk. If any viruses are encountered, you can choose to clean it right away or to look for more infected files. Detect and Clean will automatically clean up viruses it encounters without asking you. I prefer the first option, because I get the opportunity to record what files are infected. At least I have time then to see if backups exist for the infected files. I'm also a little wary of Detect and Clean trying to fix a **false alarm**.

Plain English, please!

When scanning for viruses, sometimes your software can be fooled into thinking a virus is present, when actually everything is fine. Naturally enough, this phenomenon is called a **false alarm**. An up-to-date scanner is more accurate than an old one, but false alarms can always occur.

(Tip)

Use Detect to check for viruses and let it scan the entire disk. If any viruses are encountered, copy the infected files to a floppy, and then use Detect and Clean on the hard disk after recording the extent of the infection, what files are damaged, etc. This makes replacing the damaged files easier afterwards.

By making copies of the infected hard disk files, you also protect yourself from serious damage in case it turns out to be a false alarm. You can simply reinstall the files that were erased by the Clean option. (Then go out and get a more up-to-date scanner.)

Use the third option, Select New Drive, to verify which drive letter will be scanned for viruses. Generally, you scan drive C: but anytime you receive an unknown floppy, choose your floppy drive and scan that one. Figure 16.4 shows the Detect operation in progress, with a virus detected.

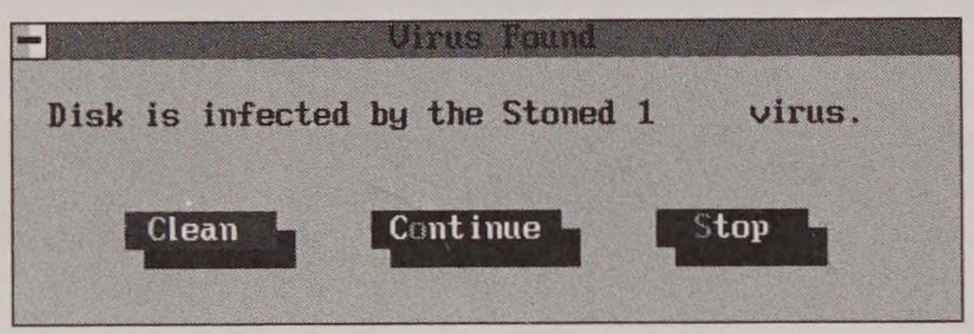


Fig. 16.4
During Detect, a bar graph shows the progress of the scan. If a virus is encountered, a message appears instantly to warn you.

Changing MSAV's options

Once MSAV is loaded, you can change the way it works at the Options screen. Press F8 or select Options from the menu to get there. There aren't too many things you'd want to change here, really. One that I think should be turned on (but normally isn't), is Anti-Stealth. It makes the scan take a little longer to complete its job, but it will also check a little harder and find more viruses.

{Note}

To change an option on this screen, you can click the correct box with your mouse, or move there with the arrow keys on your keyboard and press the spacebar.

One by-product of the Detect operation is the creation of a file named CHKLIST.MS in every directory of your disk. This file stores information about all the other files and is used to detect if any changes have been made to those files since your last scan. Not bad, but your disk fills up with *lots* of stuff. If you don't like these files, turn Create New Checksums off. Unfortunately, then the Anti-Stealth feature won't work.

(Tip)

To delete the CHKLIST.MS files that are created all over your disk, press the F7 key when you're at the main MSAV screen. This searches your hard drive, deleting the files and recovering the space they take up. Be aware that removing these checksums or disabling their related options greatly reduces the effectiveness of this program.

Running MSAV every time your PC starts

If you are the paranoid type, you can have MSAV run automatically every morning. You must modify your AUTOEXEC.BAT file, located in the root directory of drive C: (see Chapter 11, "How to Edit Startup Files with the MS-DOS Editor (and Without It)"), and insert the following command:

```
c:\dos\msav /p /l
```

Since the autoexec file is read every time the system boots, this command will execute along with it. The two switches at the end are pretty important. The /P hides all the usual colored screens and menus, just running the program without your interference. The /L switch makes MSAV scan all the local hard disk drives (in case you have more than one).

Using memory-resident programs

A good front-line of defense against virus infiltration is to use a memory-resident program that does its work automatically and quietly in the background. Most of the top scanners also come with one of these programs. They also support various options, depending on how you work and how terrified this chapter has made you.

What does VSAFE do?

If you have MS-DOS 6.0 and higher, you definitely have VSAFE. You load it by typing **vsafe** at the DOS prompt and then you can forget it's there. Once it's **resident**, it will automatically perform these functions:

- Protects against any attempts to reformat your hard disk.
- Checks any programs you run to see if they are infected with a known virus.
- Checks the boot sector of your hard disk for any of those sneaky stealth viruses.
- Protects your hard disk against any attempts to write to the boot sector.

Note that these are all protection schemes for your hard disk. They don't do much for your floppy drives or your RAM memory. If these are concerns of yours, VSAFE does have a few options you can change.

Changing VSAFE's options

As long as VSAFE is already loaded into memory, you can access a pop-up options screen at any time by pressing Alt-V on the keyboard.

The memory-resident option may be valuable unless you tend to load a lot of other programs that also stay resident in RAM. Then you're constantly responding to VSAFE's warning messages as it detects your own software.

Nobody's perfect

VSAFE and all the other memory-resident virus checkers work with varying degrees of effectiveness. One interesting thing about them is that if you load more than one, they detect each other and set off all kinds of alarms. Sometimes false alarms are generated by the software you use everyday, just because it did something that your scanner thought was "virus-like."

Also, some programs simply won't function if there is a virus scanner (or any memory-resident program) active at the time. One of the best examples of this is Microsoft's own Windows installation program.

17

A PC's Not Much Good without Application Software

Application software transforms your computer from a general-purpose tool into a word processor, a personal finance manager, a game, and more!

In this chapter:

- DOS is software but it's not an application
- What kind of software is available?
- How to pick the program that's right for you
- Tell me about upgrading
- Can I get by with shareware?

Compared to the hardware of your computer, DOS is software. However, DOS is an operating system rather than an **application**. DOS provides the environment for the various applications, and it's the applications that perform specific things like word processing.

Application software packages are the programs that let you do some really useful work with your computer. Application software uses the services that DOS provides. By relying on DOS, each application programmer doesn't have to deal with the nitty-gritty of how to read a file from a floppy disk.

The relationship between DOS and applications is like a shopping mall. A developer builds a mall. The superstructure is there—the shell of the building, the common areas, the parking lot, and the landscaping—but nothing much happens until individual stores move in. It's the stores that conduct the real business of the mall. The mall provides the forum that makes it all possible.

There's plenty of software to choose from!

A mall supports lots of different stores. There might be restaurants, theaters, huge department stores, specialty stores, and boutiques. And DOS supports lots of different software applications.

Word processing

Word processing is probably the most widely used application software for personal computers. You may already be using a program such as WordPerfect to create letters, reports, and proposals (see fig. 17.1).

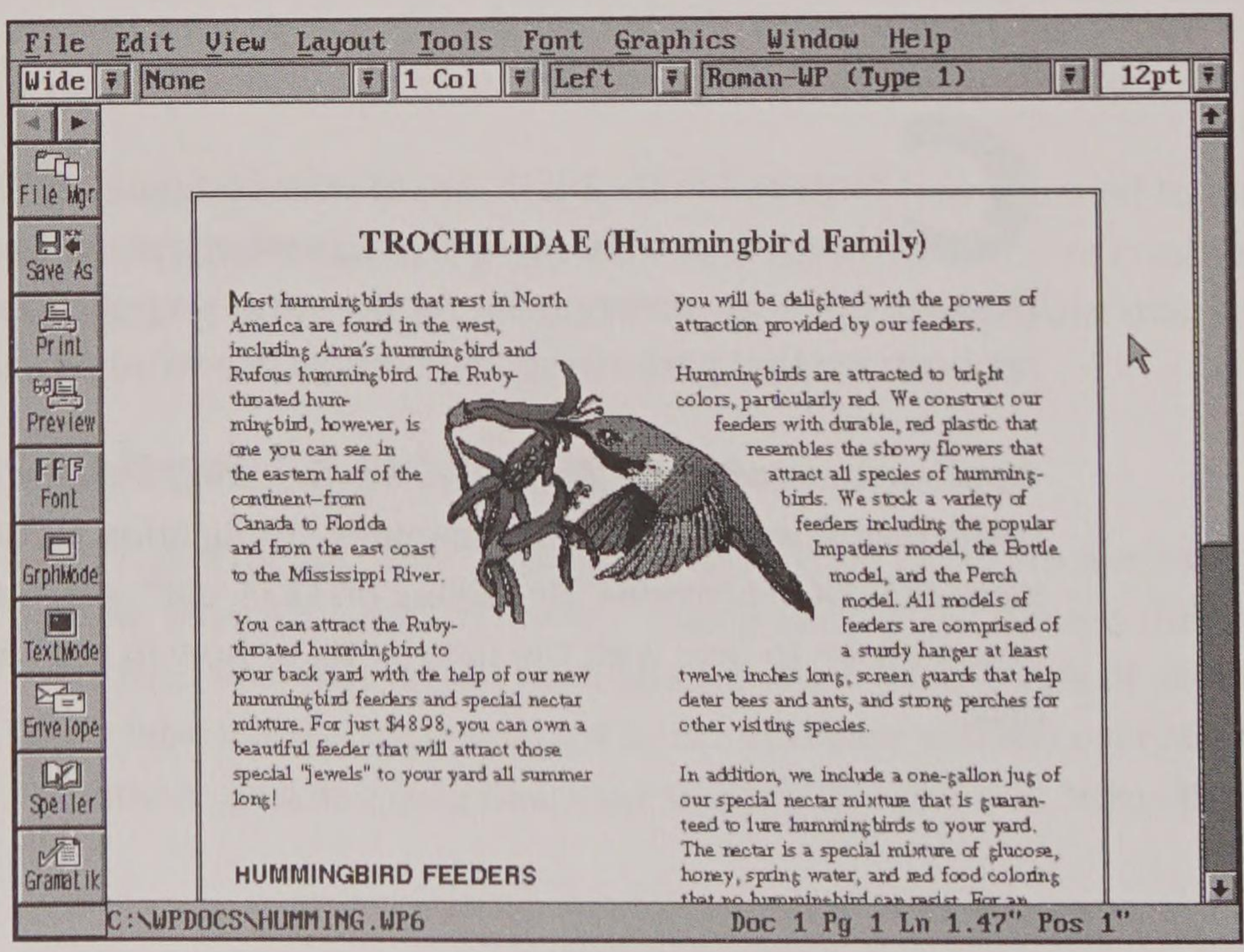


Fig. 17.1
Word processors like WordPerfect not only let you edit text, they also have lots of features for formatting text on the page to make it look better. You can even use graphics.

Spreadsheets

If you work with rows and columns of numbers, then spreadsheets are for you. Applications such as Lotus 1-2-3 have revolutionized life for number crunchers who prepare budgets and analyses of all kinds (see fig. 17.2). You just enter your numbers, add a few formulas, and let the computer do all the calculations (and the endless recalculations as the numbers change).

Fig. 17.2
Spreadsheets such as Lotus 1-2-3 are designed to do the number crunching you need for budgeting and financial analysis.

A:H2: {Shadow} READY

Budget | B | C | D | E | F | New Sheet

	A	B	C	D	E	F	G	H	I	J
1										
2		1995 BUDGET: Williamson Camera and Video								
3										
4				Q1	Q2	Q3	Q4	Year		
5		Net Sales		$10,000.00	$13,000.00	$16,000.00	$19,000.00	$58,000.00		
6										
7		Costs and Expenses								
8			*Salary*	1,500.00	1,500.00	1,500.00	1,500.00	6,000.00		
9			*Interest*	1,000.00	1,200.00	1,400.00	1,400.00	5,000.00		
10			*Rent*	350.00	350.00	350.00	350.00	1,400.00		
11			*Ads*	500.00	1,000.00	2,000.00	3,000.00	6,500.00		
12			*Cost of Goods*	3,000.00	4,000.00	5,000.00	7,000.00	19,000.00		
13		Operating Expense		6,350.00	8,050.00	10,250.00	13,250.00	37,900.00		
14										
15		Operating Income		$3,650.00	$4,950.00	$5,750.00	$5,750.00	$20,100.00		
16										
17										
18										

Comma | 2 | Styles | SWISS12 | BUD95.WK3 | ? | NUM

Databases

Databases help you manage lists of data. Those lists can range from simple mailing lists to complex order entry and inventory management systems.

There's also a range of complexity in database software. At one end of the gamut are the flat file databases, such as the database module of Microsoft Works, that manage data like an electronic version of a card file. They're generally easy to use and suitable for mailing lists and the like. At the other end of the spectrum, a sophisticated relational database, such as dBASE, is more a programming language than application software (see fig. 17.3).

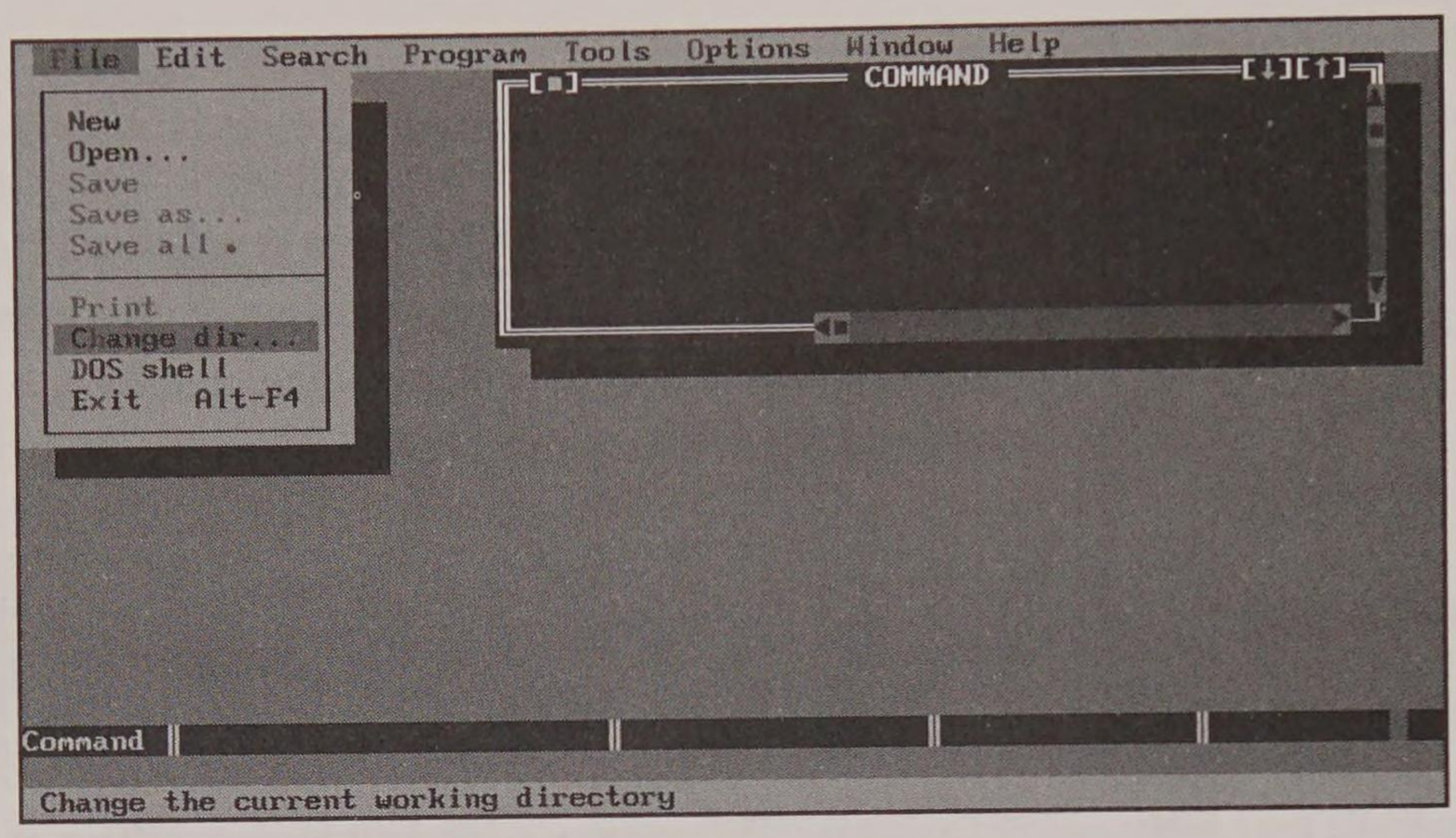


Fig. 17.3
How complex the database program should be depends on what you need to do with it.

Accounting and finance

Applications like Quicken make it easy to keep track of your income and expenses and balance your checkbook (see fig. 17.4). It may not give you more money at the end of the month, but at least you'll know where the money went.

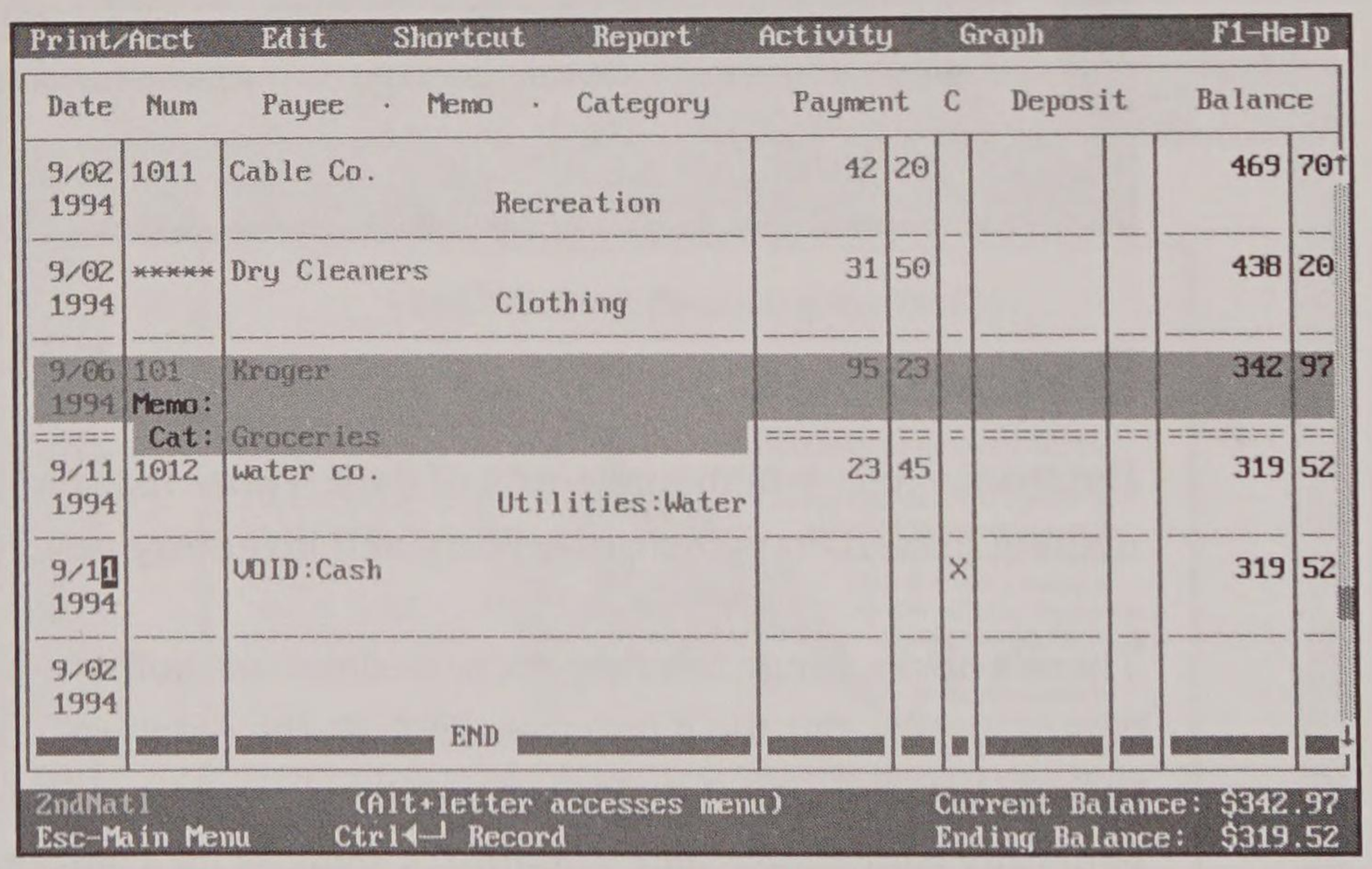


Fig. 17.4
Quicken is a very popular personal finance manager that lets you work with on-screen versions of familiar documents such as checks.

Like databases, there's a wide variety of accounting and finance software available. The applications range from simple home budget software to elaborate systems that professional accountants and bookkeepers use to manage good-sized businesses.

Graphics and presentations

With the right software, your computer can produce charts and diagrams, plus all those slides for your next business presentation. Programs such as Lotus' Freelance or Microsoft's PowerPoint can even make your presentation right on the computer screen (see fig. 17.5).

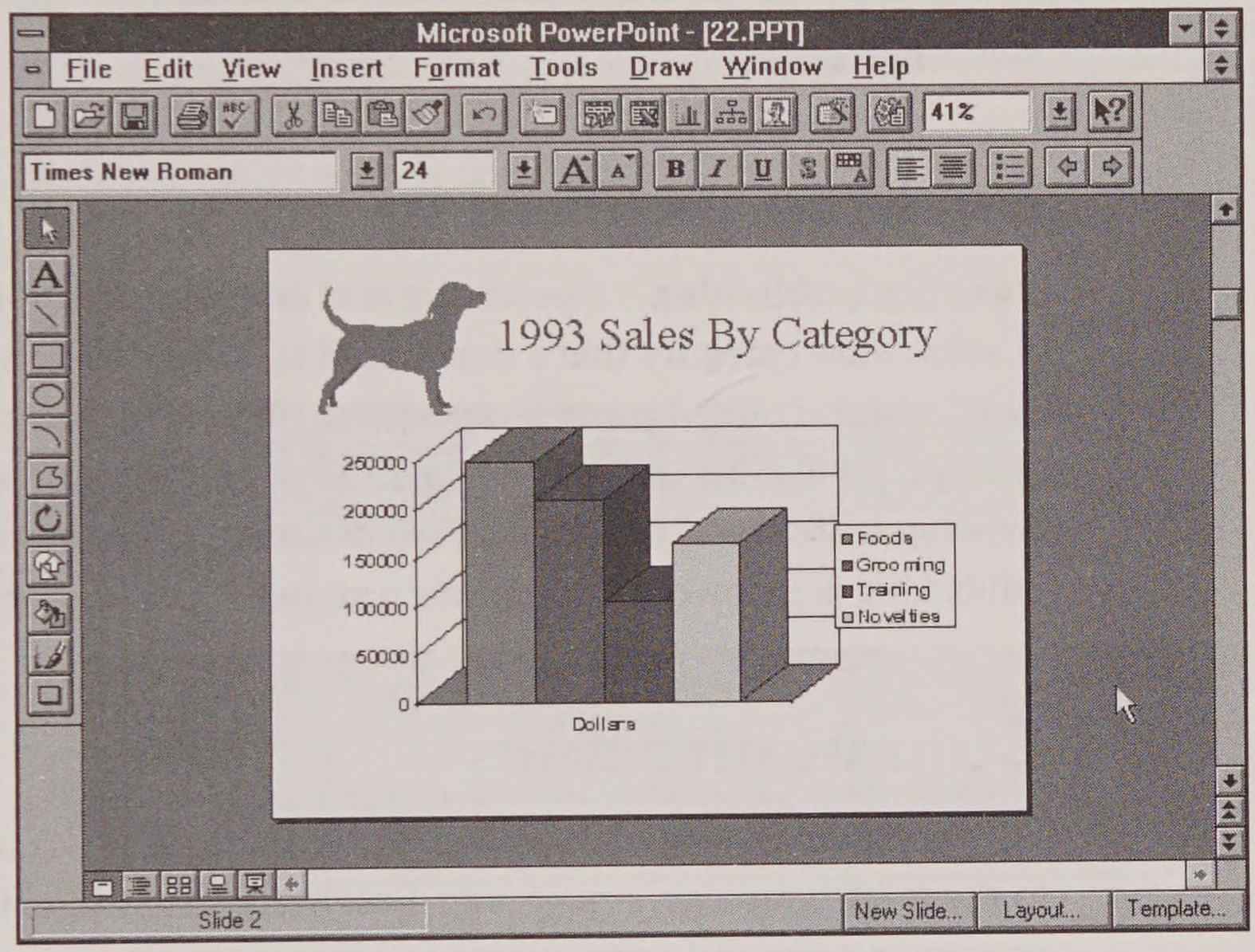


Fig. 17.5
PowerPoint is an example of a program designed to create the charts, graphs, and bulleted lists you need for business presentations.

{Note}

Increasingly, the software to create graphics and presentations is available only in Windows versions. It makes some sense because dealing with graphics requires some form of graphical user interface—you don't want to try to draw by typing instructions on a command line.

The programmers can create a user interface from scratch in each DOS program or use the one that's already available in Windows. So, it's not surprising that they write Windows programs. Also, since graphics place heavy demands on the computer hardware, any computer that can't handle Windows probably can't run a DOS-based graphics program of any sophistication either.

Computer Aided Design (CAD)

The computer monitor and mouse have replaced the T-square and triangle as the primary drawing tools of design engineers and draftsmen. Professional designers and architects use sophisticated and expensive CAD (Computer Aided Design) software such as AutoCAD. For casual users, there are simplified CAD programs tailored to creating a home floor plan or sketching a landscape plan.

Desktop publishing

Desktop publishing—typesetting text and assembling graphics on a page—is a software category that's dominated by Windows-based applications such as PageMaker. Word processors, such as WordPerfect, can handle some desktop publishing tasks; and programs such as PrintShop will let you create drawings. However, the price of admission to professional-level desktop publishing is a powerful computer running Windows (or a Macintosh).

Communications

When combined with a modem, communications programs are your on-ramp to the information superhighway. Programs such as ProComm let your computer communicate with other computers. You can connect to a remote computer across town, another computer at the office, or an on-line information service such as CompuServe (see fig. 17.6).

Organizers

Get yourself organized! Programs such as Act! and Sidekick let you keep to do lists, daily agendas, personal phone books, and client contact information on your computer (see fig. 17.7). Having the tools you need to find that information quickly can help you stay on top of your busy schedule. However, organizers (also called **Personal Information Managers**, or **PIMs**) tend to be very personal. To be effective, you have to find one that suits your working style.

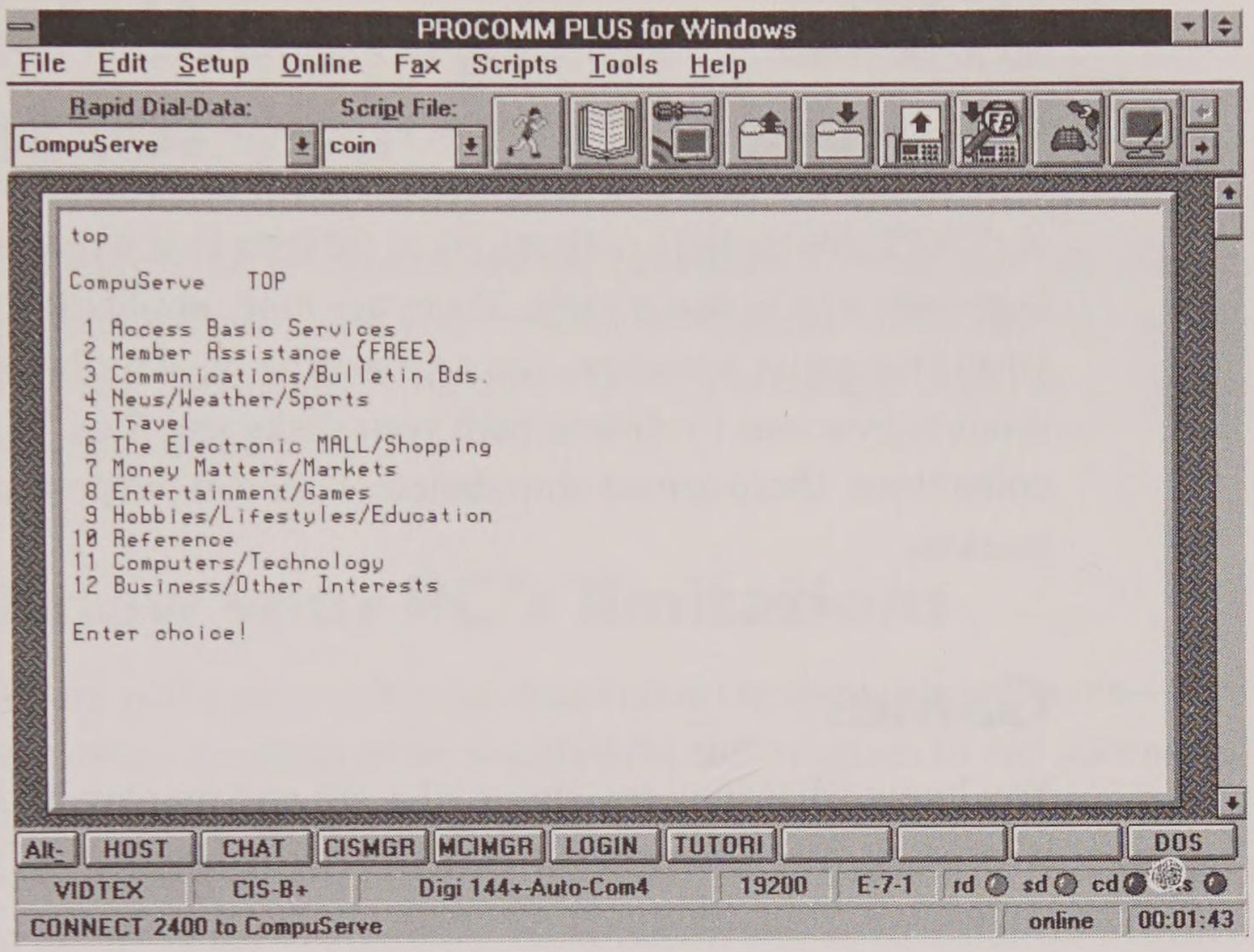


Fig. 17.6
ProComm is an example of communication software that lets your computer reach out and communicate with other computers.

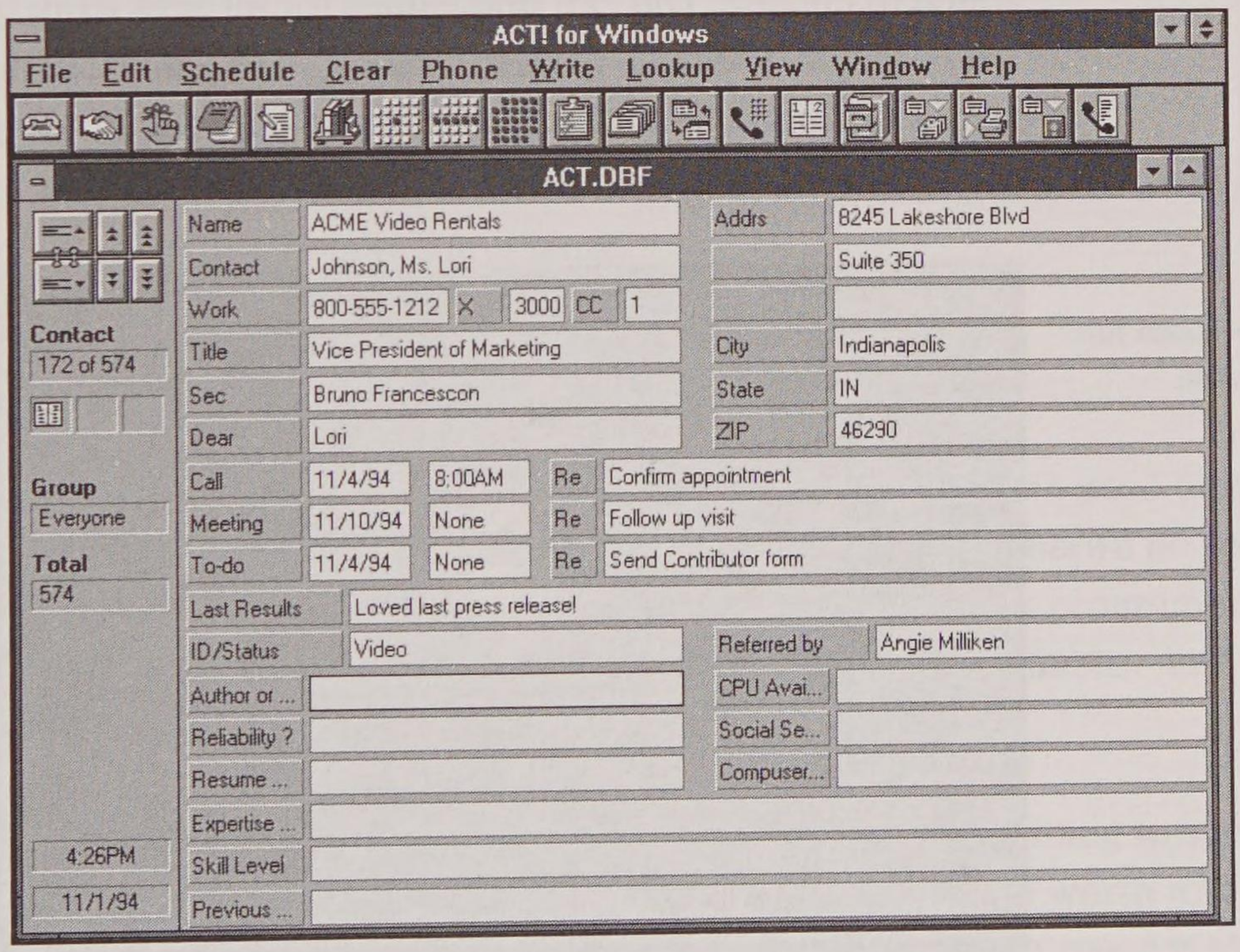


Fig. 17.7
Organizers such as Act! can help you manage a hectic schedule and all the people you must contact each day.

Utilities

If you can't find a DOS command to do what you need, there's probably a utility program that will do it—whatever *it* is. Programs like Norton Utilities and PC Tools include collections of utilities that expand and enhance the bare-bones DOS commands. There are more sophisticated backup utilities, virus protection software, and an assortment of tools for diagnosing and repairing various problems with your disks and files. In addition to utility collections, there are an abundance of special-purpose utilities on the market.

Games

You know what they say about all work and no play. Well, it's not only dull, it's just no *fun*. When you're ready to take a break from your more serious endeavors, your computer can help you have some fun. The software stores are packed with a multitude of games and entertainment software from which to choose. You can find games for all ages from preschool to adult. There are arcade-style games, puzzles, card games, board games, role-playing games, and more (see fig. 17.8)! Some of the games are just for fun, while others are educational as well as entertaining.

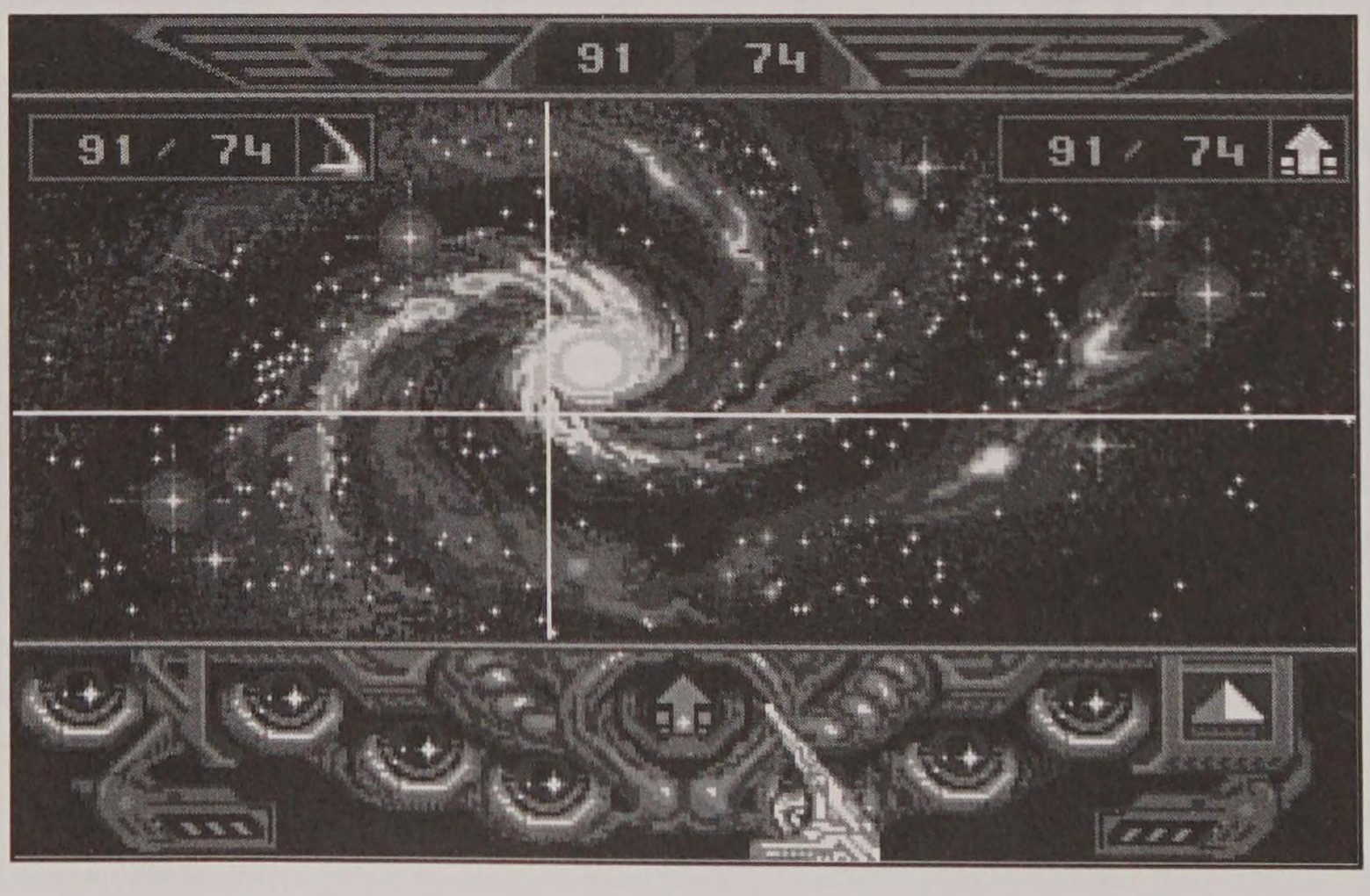


Fig. 17.8
Games can be both fun and educational.

How to pick the program that's right for you

It's easy to target what software **category** you need to look for. After all, you probably know what you want to do with the computer. The more challenging task is choosing which of the competing applications in a given category you should buy.

Know your PC's limitations

Every software application has certain system requirements—a minimum hardware configuration required for the program to run successfully. It's a little like trying to determine what kind of vehicle you need. One person commuting to work can get by with a small economy car. On the other hand, a family of six heading out on vacation will need a station wagon or van. There are some software programs that need only the computer equivalent of a small car (or even a motor scooter), while others demand nothing less than a large truck or bus.

See Chapter 18, "Basic Guide to Installing New Software," for details on dealing with system requirements.

Know your own limitations

You also need to consider your own limitations. You don't need to get an advanced program if your skills and needs are simple. There's no sense spending the time and effort required to learn a complex program to do a simple job. At least, not if there's a simpler program available—and often there is.

Another thing to think about is how much time you're willing to spend putting information into the computer. Will the result be worth it? Just because something *can* be done on the computer doesn't mean it *should* be done on the computer.

Ask at least two friends

Catalog descriptions and the promotional copy on software boxes don't give you enough information to make an intelligent choice between application programs. Magazine reviews help, but they still aren't enough. Your best source of information is people who use the applications you're considering. Talk to friends and co-workers. Find out what software they use, why they chose that program, and what they like and dislike about it. Don't forget to consider how your own needs and priorities may be different from your friends'.

Try before you buy

It's almost impossible to judge how you will like a program until you've actually used it. So, if possible, find one of those friends who recommended a software program and try it out on their computer.

Uh-oh. This program requires Microsoft Windows

That's happening more and more these days. It seems like all the new programs are designed to run in the Windows environment. If you're not running Windows—whether because your computer isn't up to it or just because you "don't do Windows"—then you won't be able to use a Windows application.

{Note}

Reality check. Sales of Windows applications have eclipsed sales of DOS-based applications and most software developers are concentrating their efforts on the Windows market. As a result, most of the new and updated software will be for Windows.

However, that doesn't mean DOS is dead. You can expect DOS and DOS-based applications to remain useful and be supported for some time to come.

In some areas, such as desktop publishing and graphics, there's no DOS-based alternative to the dominant Windows programs. If you need to do that kind of work, you'll have to make the switch to Windows.

On the other hand, there are DOS versions of many of the top programs such as WordPerfect, Lotus 1-2-3, and FoxPro. You may hear more about the new Windows versions of those programs these days, but the DOS versions are still very much alive. If you don't see them on the shelf or in the catalog, just ask.

A software suite or integrated package might do the trick

If you need a word processor, a spreadsheet, and a simple database, then an **integrated package** such as Microsoft Works can provide a one-stop solution. While the individual components aren't usually the "best-of-breed," their ability to work together is a distinct advantage. These packages can be a good choice for a home user or small business that needs a good range of features at a modest cost. Just be aware that the strength of an integrated package is in its breadth, not its depth. Consequently, an integrated package may not be able to withstand heavy demands on one of its components.

On the other hand, a **software suite** can be a very good buy these days. A suite is a combination of several major packages, designed to work together. The most popular suites right now are Microsoft Office, which combines Word for Windows, Excel, PowerPoint, and Access; and Lotus SmartSuite, which puts together 1-2-3 for Windows, Ami Pro, Freelance, and Approach.

About software upgrades

A **software upgrade** is a new version of the program. And like the new model of a car or a stereo, it's intended to be an improvement of what came before.

Software companies release new versions of their programs to fix problems and to add features. The goal is to improve the program's appeal so new buyers will purchase their program instead of a competitor's. The additional income from users who upgrade from previous versions to the latest release is also a powerful motivation for companies to release an upgrade.

In general, there are two kinds of upgrades: **maintenance upgrades** and **new versions**. Maintenance upgrades fix *problems* with the existing software, and may add to or improve it in relatively minor ways. Often these maintenance upgrades are sent to registered users automatically. (This is a good reason to **register** your software with the manufacturer after purchasing it.) Typically, maintenance upgrades are free. If there's any cost to the user, it's just a small charge for disks and handling.

Major new software versions add *features* to the program. Sometimes, the improvements are subtle. Other times, the changes are so dramatic that the new version hardly seems like the same program any more. Either way, you can expect to pay for anything that the software developer considers a major upgrade. Users of the current version usually get a break, but the upgrade may still cost as much as two-thirds of the retail price of the new software.

If your current software is getting the job done, why spend time and money on an upgrade? Besides the natural desire that most of us have to own the latest gadget, there are two reasons to fork over your hard-earned money for an upgrade:

- You need (or at least can make good use of) one of the new features or bug fixes.
- For compatibility with others. Even if you don't need the upgrade, you may have to buy it if you need to exchange files with co-workers who have upgraded to the new version.

What about shareware?

Shareware isn't free software (that's called **freeware**), and it's not junk applications created by amateur programmers (although that description could apply to *some* shareware programs).

Shareware is simply an alternate distribution method for software. For the program developer, it provides the opportunity to skip the usual distribution channels and get their program out to the public without high marketing costs. For the user, shareware provides you the opportunity to try before you buy.

Shareware marketing is basically just word of mouth. Program files are exchanged among friends and downloaded from on-line systems. Copying the files is legal because it's done with the permission and encouragement of the software developer.

When you get a shareware program file, you can install it on your computer and try it. If you like it after you've used it for a reasonable trial period, you send a registration payment directly to the software author. Typically, the shareware registration fee is less expensive than the retail price of a comparable commercial program.

It's all supposed to work on the honor system. However, many shareware developers use gentle (and sometimes not-so-gentle) inducements to get you to register the program. Often, registered users get a new version of the program with additional features. Another common technique is to incorporate reminder screens requesting that you register the program. Shareware that includes such screens is often called **nagware**. Some shareware includes a timer that causes the program to quit working after a period of time.

The quality of shareware programs runs the gamut. Some of it is pure junk—the first programming attempts by stumbling amateurs. You can also find some of the best and most innovative programs available as shareware. The vast majority of shareware falls somewhere between these extremes. As a rule, shareware isn't as polished and slick as commercial programs, and shareware almost never has fancy packaging. But there are plenty of competent programs from which to choose.

18 Basic Guide to Installing New Software

In this chapter:

- Is your computer up to the challenge? Check the system requirements
- How to guarantee that the installation goes well
- What to expect when installing a DOS-based program
- Windows installations are even easier!

Okay, you're back from the computer store with a new software program. You've got a box with manuals and a bunch of disks. Now what?

Every program can be different. Consequently, we can't give you foolproof instructions that will successfully install any program. However, we can describe what to expect in typical situations.

Wait! Check the system requirements before you buy anything!

Before you attempt to buy software, check the program's **system requirements** against your computer's specifications. Are you driving a big enough truck to haul this load?

Every software program expects and requires certain hardware—a minimum system configuration necessary for the program to run successfully. The system requirements generally appear in advertisements for the product, and on the outside of the program's box or package.

In order to compare your computer with the program's system requirements, you must know your system and its major components. If your truck is a little compact pickup, you can't expect to fit a full-size sofa in the back. It requires more space than you have available, so you need a bigger truck to carry it. Similarly, you'll need to make sure your computer meets or exceeds the system requirements of the software.

What do I need?

Most software programs post their system requirements on the outside of the box or package. If you don't find them there, check the manual. The system requirements should be listed in the first few pages. Look for something like this:

- DOS operating system 2.0 or higher
- 384K memory
- Hard disk with 1.5 MB free
- CGA, MCGA, EGA, or VGA display
- Mouse recommended

Most of the points are self-explanatory. The one that could be confusing is the memory requirement. It means that the program needs 384K of *conventional* RAM memory in order to load and run. You need to make sure your system has that much free memory available *after* you load DOS and your usual assortment of device drivers into the 640K of conventional memory.

Also, remember that the posted system requirements are usually *minimums*. You may need more memory, disk space, or other computer resources in order to use optional software features or to get optimum performance.

How much memory do I have?

The easiest way to check is to run the MEM command to get a report on your memory after you start your system normally. Figure 18.1 shows a typical report from the MEM command. Look for the line that starts `Largest executable program size` and check the number in the last column to see how much memory is available. Check out Chapter 23, "Make the Most of Your Memory with MemMaker," for more information on memory.

Fig. 18.1
If you don't have enough memory free, the program will never run.

```
D:\>mem

Memory Type        Total   =   Used   +   Free
----------------  -------      -------    -------
Conventional         636K        140K       496K
Upper                  4K          4K         0K
Reserved               0K          0K         0K
Extended (XMS)     7,164K      6,140K     1,024K
----------------  -------      -------    -------
Total memory       7,804K      6,284K     1,520K

Total under 1 MB     640K        144K       496K

Total Expanded (EMS)                  1,024K (1,048,576 bytes)
Free Expanded (EMS)                   1,024K (1,048,576 bytes)

Largest executable program size         496K (507,584 bytes)
Largest free upper memory block           0K      (16 bytes)
MS-DOS is resident in the high memory area.

D:\>
```

This is the number you need to know

How much disk space do I have?

The quickest way to check how much disk space you have available is to use the DIR command. You just type DIR at the DOS prompt in any directory of your hard drive. DOS will list the files in the current directory and, at the bottom of the list, report how much free space remains on the drive.

{Note}

The DIR command reports free space in bytes. To convert that number to KB (kilobytes) you need to divide by 1,024. For MB (megabytes) you need to divide by 1,048,576.

For a quick and dirty approximation of KB or MB, just move the decimal point in the number DIR reports. Think of KB as thousands of bytes and MB as millions of bytes. Just remember to round the number *down* a bit.

For example, suppose DIR reports that you have 74,694,656 bytes free. The quick method lets you estimate that you have 74 million bytes available. If you drag out a calculator and do the division, you'll find that it's really 72,944 KB or 71.2 MB.

When you're assessing how much disk space you have free, don't try to cut it too close. Barely enough hard drive space to meet a program's system requirements isn't really enough. In addition to the space required for the program files, the program (and perhaps its installation utility) will need space for temporary files and such. You'll also need somewhere to store the data files and documents you create with the program. It often adds up to significantly more than the software's stated system requirements.

What kind of hardware do I have?

If you don't know what kind of computer hardware you have, it's not always easy to find out. All those cards and chips inside the computer tend to look alike—but they do very different things. Hopefully, the store where you bought your computer, or the guru who configured it for you, gave you a specification sheet detailing what components are installed in your system.

If you have to compile a hardware inventory yourself, start by gathering up all the manuals that came with your system or with any components you've added. You'll probably find the information you need in the first few pages of each manual. If you can't figure it out, pack up the manuals and take them with you to the computer store when you're shopping for new software.

A useful tool for determining what hardware is installed in your computer is the Microsoft Diagnostics program (MSD). (It's a system diagnostic program that's included free with most recent versions of DOS.) To run Microsoft Diagnostics, type MSD at the DOS prompt. The main screen provides a lot of information and you can get more details by selecting any of the category buttons.

To get a printed report from MSD, select Print Report from the File menu, check the Report All option, and click OK. Make sure there's plenty of paper in your printer. MSD will tell you more about your computer than you ever wanted to know. If you can't spot the information you need among the gobbledy gook, take the print out to the local computer guru and ask for a translation.

I think I have more than they're asking for

Remember that the system requirements listed for the program are the *minimum* requirements. Normally, the program will run just fine if your computer's system specs are newer, faster, or larger than the requirements. There are a few programs that were written for older computers and don't run well on newer machines—but they're the exception rather than the rule.

Steps for a successful installation

If you want to be assured of a trouble-free installation, your first step is to read the section of the manual on installing the program. Also, since you can expect the installation program to need information about the hardware that the program is going to run on, you need to know your system configuration and be ready to answer questions about it.

{Note}

Many programs now compress the files on the distribution disks in order to conserve disk space. Copying these compressed files to your hard drive isn't enough. The files must be expanded from their compressed form back to their full size before you can use them.

If this step is necessary, it's usually handled automatically by the installation program. Rarely, you'll have to do it manually. If so, there should be specific instructions to do so in the manual or README file.

Make copies of the floppy disks

Paranoia alert! It doesn't happen often, but you *might* make some mistake during installation that damages one of the disks from which you're installing the program. To guard against this happening, you should use the DISKCOPY command to make copies of the installation disks that come with your software. Then, put the original disks in a safe place and use the copies to install the software.

If your software comes on a CD-ROM, you can skip this step. Fortunately, CDs aren't very susceptible to being damaged by mistakenly recording information on the disk. Of course, it isn't practical to copy an entire CD anyway.

Decide on a final resting place for the files

Most programs need a home to call their own. So, they'll need to be installed in their own directory on your hard drive. Typically, the programmers will make some assumptions about your system and the program's installation utility will suggest a directory name. You can take the suggestion or supply one of your own. A few installation programs aren't so polite. Instead of making a suggestion, they just create whatever directories they want without consulting you. Occasionally, a program will demand that you create the directory before starting to install the program.

Some programs require manual decompression

Shareware and some other software is frequently distributed in a compressed format—called an **archive file**—that condenses multiple files into a single, smaller file. This file compression facilitates distribution over modems.

You can often recognize compressed files from their extension. Extensions for some of the popular compression programs are ZIP, ARC, LHA, and ARJ. Some compressed files have the EXE extension.

To use the compressed file, you copy it to a temporary directory on your hard drive and extract the component files from the archive. If the file has an EXE extension, you can simply type its file name to start the automatic process of extracting files from the archive. Otherwise, you'll need to run a utility program to expand the archive. If you don't have a copy of the program to expand the files, ask the person who gave you the archive file.

Once you've expanded the archive file, you can look for a file containing instructions and follow them to install the program.

What if there's no installation program?

If there's no install program, you need to check the manual for installation instructions. Also, look for a file named READ.ME, README.TXT, or something similar on the distribution disk(s). You might find instructions there.

If you can't find installation instructions anywhere, it might be because you don't have to install the program in order to run it. You may be able to run the program directly from the floppy disk or CD. If you'd prefer to run the program from your hard drive, then just create a directory for the program and copy all the files from the floppy disk into the directory.

How to install a DOS program

Most software developers include with their program a utility or batch file to help you install the program, such as the one shown in figure 18.2. With a little luck, this installation utility might completely automate the process.

Fig. 18.2
Once the installation program is running, many programs fill the screen with lists of product features, suggestions for improving your setup, or requests that you register your software. They're usually worth at least a cursory reading.

```
P R O D I G Y (R)  S o f t w a r e  I n s t a l l  P r o g r a m

        Your PC Setup                    Your MODEM and PHONE Setup
System Type:  PC-AT                  Modem Port:
DOS version:  6.20                   Modem Speed:
Printer Port: «LPT1»                 Phone Type:

                    Your PRODIGY Software Setup
Install to Disk(s): «C:(8Meg free)»
Display:            «VGA/EGA - Color, Low Resolution»

The list above shows what Install needs to know before it can continue.

Items surrounded by « » were found by Install when it scanned your computer.
Items shown as [redacted] must be supplied by you during the next few steps.
After completing the list, you will be given a chance to change any of the
entries.

NOTE: If you use memory-resident programs, press [F1] for more information.

                    Press any key to continue.

[F1] for HELP                                   [F10] to EXIT
```

If you're the impatient type, you can often just stick the first distribution disk into your floppy drive and use the DIR command to list the files it contains. Look for an executable file (COM, EXE, or BAT extensions) called INSTALL or SETUP, then run that file and follow the instructions and prompts from the installations utility.

What to expect while installing

It's common for an install program to pause and ask you questions during installation. Here are some of the more common questions and warnings you might see.

Insufficient disk space

This could be a big problem. If there isn't enough space on your hard disk, the installation program can't do its job and install the program. But how can this be? You checked the free space on your hard drive and compared it with the program's system requirements. The drive's starting to get full, but there's more than enough room for the program.

The problem can occur because the installation program may need to create temporary files in order to install the program. The temporary files won't be needed to *run* the program, and they'll be deleted after the program's successfully installed. In the mean time, however, the installation utility needs some elbow room to work in or it'll never get that new program installed.

If you get a message about insufficient disk space, there's no alternative but to abort the installation and clean up your hard drive to make more space available. You'll need to remove unneeded and obsolete files and directories from your hard drive and then try the install program again. Perhaps it's time to consider compressing your hard drive in order to gain more space. See Chapter 24 for more information on DOS' disk compression utilities—DoubleSpace and DriveSpace.

You usually have to indicate your display type

For good video performance, most DOS programs must interact directly with your hardware. To do so, the program must know what kind of display you have. The brand name of your monitor doesn't generally matter. The information that the install program is looking for is which video standard your computer's display adapter can handle. The choices are usually CGA, MCGA, EGA, VGA, or SVGA. If you don't know what kind of system you have, check the manual that came with your monitor, or consult your local computer guru.

Do you know what kind of printer you have?

If the program you're installing is capable of printing, you'll probably have to tell it what kind of printer you have. It'll need this information in order to send the appropriate commands to the printer and print the documents you create. You'll need to know the brand and model number of your printer.

Answering this question correctly can be tough. Usually, the installation program will supply a list of supported printers and you can choose your printer from the list. That seems simple enough as long as you have the information on your printer.

However, it gets tougher if your particular printer isn't listed. Sometimes you can get by with picking from the list another printer from the same manufacturer. If your printer will **emulate** (imitate) another, more common, printer, you might be able to find that printer on the list. (If you go this route, don't forget to put your printer in its emulation mode before you try to print from the newly installed program. See your printer manual for details.)

Q&A

Nothing on this list even resembles my printer!

If you can't find a better alternative, you may have to resort to the lowest common denominator—the "generic" or "ASCII text" printer setting. Most programs will have the option of printing plain text without any printer-specific formatting codes, and most printers will print such text in some default font. It won't be pretty, but at least you'll be able to print something until you can consult with tech support for the software or with the printer manufacturer to get a better solution.

Sometimes it doesn't even ask any hardware questions

It's rare, but it happens. A few programs just don't need any hardware information. Then there are some install programs that can test your system and find out what it needs to know about the hardware you have installed.

Just beware, because the automatic detection routines may not have gotten accurate info.

At any rate, if this happens to you, you'll probably be able to adjust the program's configuration from within the program. Most programs have some sort of configuration or setup command; although occasionally, you will need to run a separate configuration utility to do the job. Also, don't be surprised if you find yourself looking at a setup screen the first time you attempt to run the program.

What if the program wants to modify your CONFIG.SYS and AUTOEXEC.BAT files?

Frequently, a program needs to add its directory to the PATH statement in your AUTOEXEC.BAT file. Perhaps it will need to make other modifications to your startup files as well. The polite ones ask for your permission first, others just do it.

{Tip}

Always copy your AUTOEXEC.BAT and CONFIG.SYS files onto your emergency boot floppy disk *before* installing any new software. (Even if the files are already on the floppy, copy them again so you have the latest versions.) If the program you're installing automatically changes one of these files and your computer no longer works, boot from the emergency disk.

{Note}

Many programs save a copy of AUTOEXEC.BAT and CONFIG.SYS files to a different extension before altering them, so that you can recover them if necessary.

You need to be aware that any changes made by one program might cause problems for your other programs. As a result, you may prefer to check the manual to see what changes the program requires and then make them yourself so you can exercise control over the process and arbitrate potential conflicts.

<Caution> Many DOS programs seem to assume that they will have exclusive use of your computer and can modify its configuration to create an optimum environment. They do so without regard for the consequences these changes may have for other programs you need to run. As a result, installing a new program may "break" another program already installed on your computer. Frequently, the problem can be traced to changes in your system startup files.

Actually, it's not so terrible for the installation program to make changes in your startup files. Once the installation is finished, you can review the changes in your startup files before letting them take effect by rebooting the computer. Some installation programs even show you the changes on-screen. You can always restore your backup copies of the files if necessary.

Basic steps for installing a Windows program

In some ways, Windows programs are more complex than DOS programs. However, their adherence to standards makes working with Windows programs easier.

In particular, there are fewer worries about hardware configuration with Windows programs because Windows acts as the intermediary between programs and your hardware. As a result, you don't need to configure a new program to work with your printer. The software can just send a print job to Windows and let Windows handle getting it to your particular printer. Of course, you must configure your printer to work with Windows—a step that isn't necessary in DOS—but once that's done, your printer is available to all Windows programs without any further configuration effort.

There are a few exceptions, but most Windows programs employ a setup utility, such as the one shown in figure 18.3, to install the program. Typically, the setup utility for most programs will even have the same name and you can usually find it in the same place—on the first distribution disk or the CD. Here's the usual process for installing a Windows program:

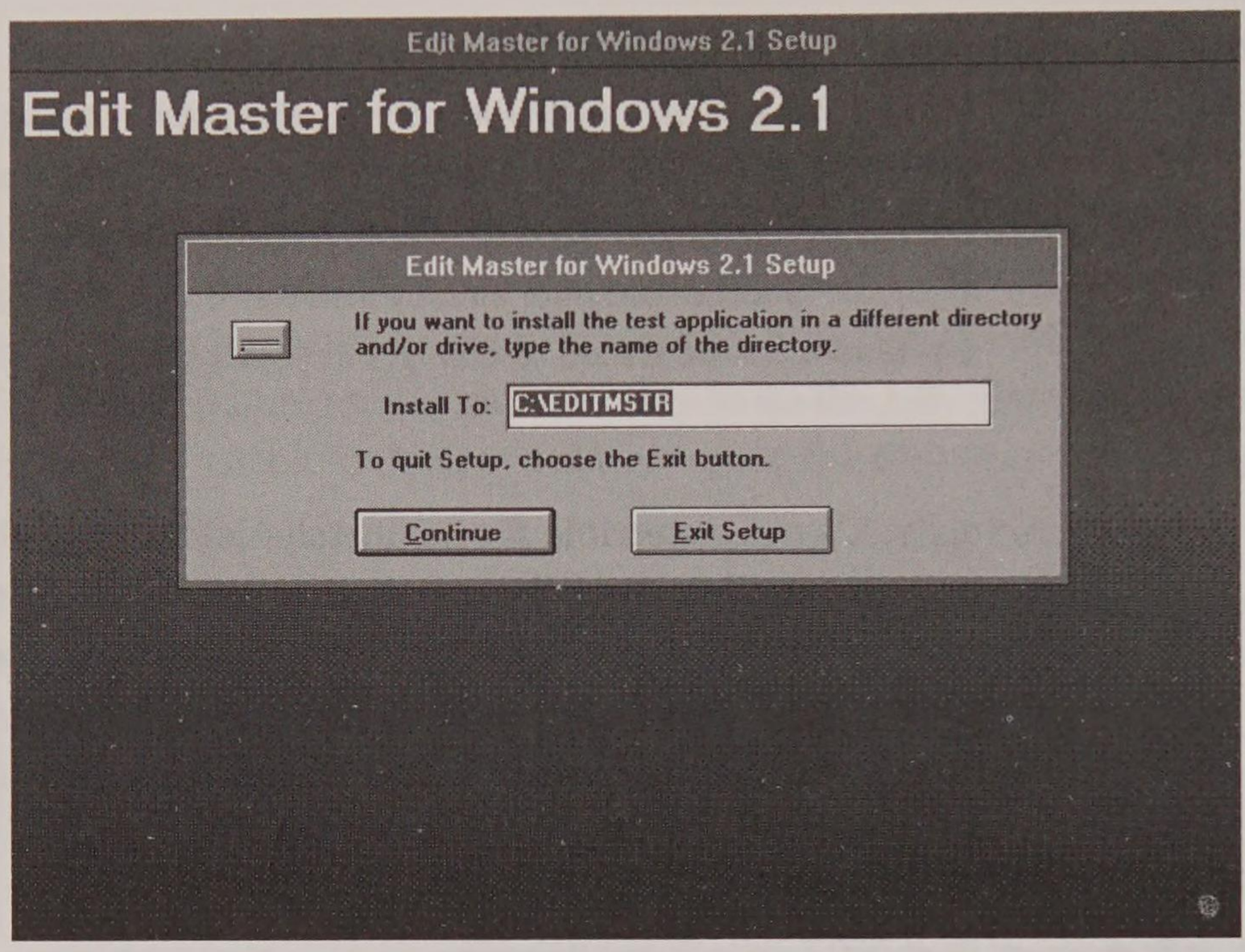


Fig. 18.3
This is a typical setup utility for a Windows program.

1. Insert the first distribution disk into your floppy disk drive (A:). If you're installing from a CD, place the CD in the CD-ROM drive.
2. Start Program Manager or File Manager, and issue the File, Run command.
3. Type **a:setup.exe** in the Run dialog box and click OK to start the Setup program. If you're using a CD, substitute the drive letter for your CD-ROM drive for **a:** (for example, type **d:** or **e:**).
4. Follow the instructions in the dialog boxes presented by the Setup program. You'll probably need to supply (or at least confirm) the name of a directory where the program will be installed. You may also need to answer other questions or select what portions of a large program you want to install. Besides installing the software, the setup program may present copyright notices and other information for you to read.
5. Insert other distribution disks in the floppy drive if the Setup program prompts you for them.
6. The Setup program for most Windows programs will also install the program in Program Manager for you. You may need to specify which program group you want the program item icon in.

19 Running DOS Software

In this chapter:

- Where's that program I installed?
- How to work those menus and dialog boxes
- Ready to save your work? How about printing?
- Getting help
- How to get out of the program

You've done your research, you've bought your software. Now get ready to run it!

You've selected and installed a new software application. Now, how do you run it? That's a little like asking: How do you drive it? The answer depends on what *it* is. The driving techniques are different for a car, a truck, a farm tractor, or a bulldozer. Still, despite the differences, there are some basic similarities. Whether you're driving a family car or a bulldozer, you need to start the engine, make it go forward or reverse, and control its speed and direction.

The same thing applies to software applications. Every program is different and the exact procedures to start and run the program will vary. But there are some basic similarities that many applications share. Knowing what they are can help you get up to speed quickly with a new program.

I know I installed the program. Where did it go?

Before you can start a new program, you need to know two things:

- The program's location
- The command that runs the program

If the installation program asked you for the directory where you wanted to install the new program, great! You already know where to find it. Use the CD command to change to that directory.

Some installation programs make assumptions about where to install the program. They don't ask questions or offer options. Some arrogantly require specific directory names. So how do you find the new program's directory if the installation program did everything automatically without telling you what it did?

Look for a new directory

Actually, it's not as difficult as it might seem. You go to the root directory of your hard drive, get a directory listing, and look for the new directory created by the installation program.

To change to the root directory and get a directory list, try this sequence of commands:

```
cd \
dir *.
```

The second command—DIR *.—instructs DOS to display a list of items with any file name but with no extension. Since most files have extensions as part of their file names and most directory names do not, you get a list of the subdirectories in a directory.

As you scan the directory listing, look for a logical abbreviation of the program name as the directory name. For example, you might find WordPerfect 6.0 in a directory named WP60. If you don't see an obvious candidate in the list of directories, look for anything new and unfamiliar. Also, the date that the directory was created is a really good clue. If you look for the current date, that might help. Change to the new directory when you find it.

Search for executable files

Your best bet for properly starting (also called **launching**) a new program is to look in the manual for instructions. However, if you're impatient, you can look in the program directory for an executable file—the file that will run the program itself.

Executable files have EXE, COM, or BAT extensions, with EXE being the most likely candidate.

In addition to the program itself, there may be several executable files in a program directory that run various utilities and support programs. The file you're looking for probably has the same name as the program, or an abbreviation of that name. For example, the executable file to run MyProgram might be MYPROG.EXE.

To start the program, type the file name at the DOS prompt like so:

```
myprog
```

That'll usually do the trick and start your new program.

Q&A

What happens if I try the wrong program file?

If the command doesn't start the program as expected, it might be because the executable file you just ran is some subsection of the main program. You might see an error message, or the screen might go blank momentarily. Either way, it seldom causes any harm. Just try other executable file names in the directory until you find the right one.

Give up and read the manual

If all else fails, read the manual to find the proper way to launch the program. The program might require a special command parameter to start successfully, or you might need to run a configuration utility before running the program the first time.

Let's hope it has a menu

OK, the program's running—now how do you use it?

Potentially, every program is different—it works the way the programmers decided to make it work. However, most program designers try to make their programs easier to use by making them **intuitive**. That means you can use your intuition and guess how something might be done—and be right most of the time.

{Note} Unfortunately, the program is based on the programmers' intuitions, not yours.

Your intuition may not help much at first. Still, once you see how things are done in a few programs, you can start making some pretty good guesses about how to do similar things in another program.

Menus help make programs more **user-friendly** (easy to use). A **menu** is a list of commands that appear on-screen when the program is running. Having a menu available means that, instead of having to know what commands you must type to do something, you can select a command from those listed in the menu. Frequently the menu appears in a horizontal bar across the top of the screen. When you click on one of those menu items, a list of available commands drops down from the menu bar as shown in figure 19.1. Not surprisingly, these are called **drop-down menus**.

Menus serve the same purpose in software applications that they do in a Chinese restaurant. If you have a menu, you don't have to be a connoisseur of Oriental cooking to know what to order. You can just refer to the menu and order dinner number 14. Much simpler.

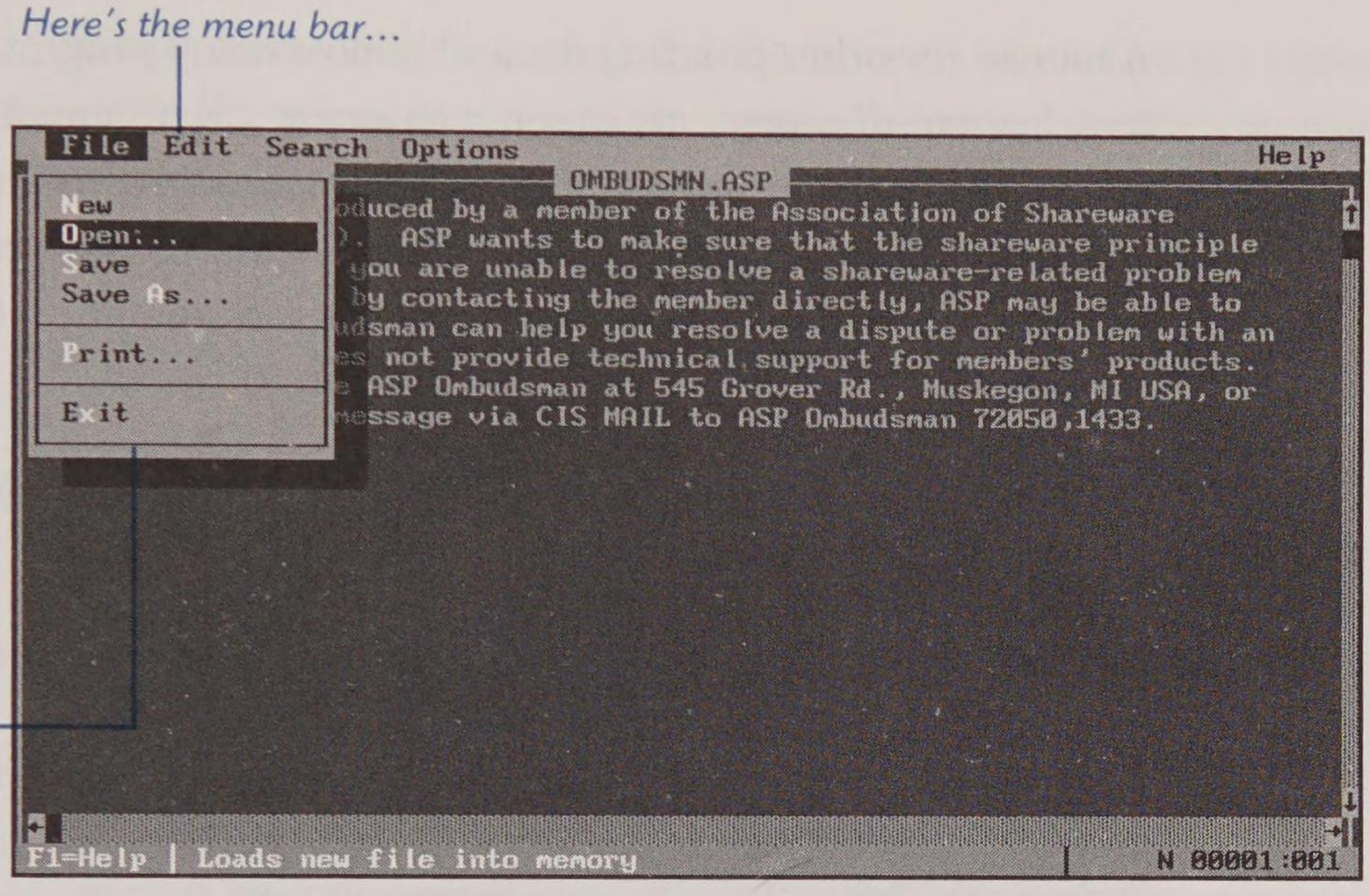


Fig. 19.1
The menu bar typically resides at the top of the screen, as shown here in the MS-DOS Editor. However, menus sometimes appear at bottom of the screen or in other configurations.

(Tip)

Even if you don't see a menu when you first start your application, there may be one hiding behind the scenes. In some programs, the menus are optional and don't appear on-screen by default. You may need to press a function key or other keystroke combination to show the menus. Try dragging the mouse pointer up to the top of the screen. That works in some programs. Or, you might need to activate the menus with a configuration option of some kind. Check the software manual to see if menus are available and how to use them.

The average program has far more commands than will fit in a single on-screen menu. Therefore, the menus are usually arranged in a hierarchy with only the top level appearing initially. Selecting an item from the top-level menu then brings up a list of related commands (a **submenu**). Finally, after you work your way down the hierarchy from the top-level menu through sub-menus to select an individual command, the program will execute that command.

And mouse support would be nice

When you start a new program, try moving your mouse. Does the on-screen cursor, pointer, or perhaps a highlight move? If so, you're in luck; the program provides mouse support.

A mouse (or other pointing device) makes many programs much easier to use. Instead of repeatedly tapping an arrow key to move the cursor, you simply move the mouse and the on-screen pointer will move correspondingly. In particular, making menu selections is much easier—you just move the mouse to point to the menu and click the mouse button to select a command.

There's a menu, but no mouse!

Maneuvering through menus is easier with a mouse, but a mouse is seldom required. You can usually make menu selections with the keyboard as well.

If you don't have a mouse (or the program doesn't support your pointing device), try pressing the Alt key and the first letter of a menu name to select a menu. For instance, pressing Alt-F will select the File menu in many programs. The same technique usually works to select a command from an open menu. Some programs require you to press the Alt key by itself to activate the menu bar, and then the underlined or highlighted letter in the menu name.

(Tip)

Sometimes there'll be more than one menu item with the same initial letter. In that case, the programmers usually pick another letter to combine with the Alt key to access the menu or command.

An underlined or highlighted letter in a menu item normally indicates the **hot key** that selects that item.

Another mouseless menu technique is to use the arrow keys to move the highlight to a different item or command in the menu. You may first need to press a key—such as the / (slash)—to activate the menu and highlight one of the commands. Then, you usually select the highlighted command by pressing Enter.

A dialog box means you're still in charge

You select a command from a menu and expect the program to execute that command. However, the program opens the dialog box, like the one shown in figure 19.2, instead. Don't worry, the program isn't refusing your instruction.

It just needs more information. For instance, if you select the Open command from the File menu, the program needs to know *which* file you want to open. Dialog boxes also let the programmers present several related commands together instead of requiring separate menu entries for each one.

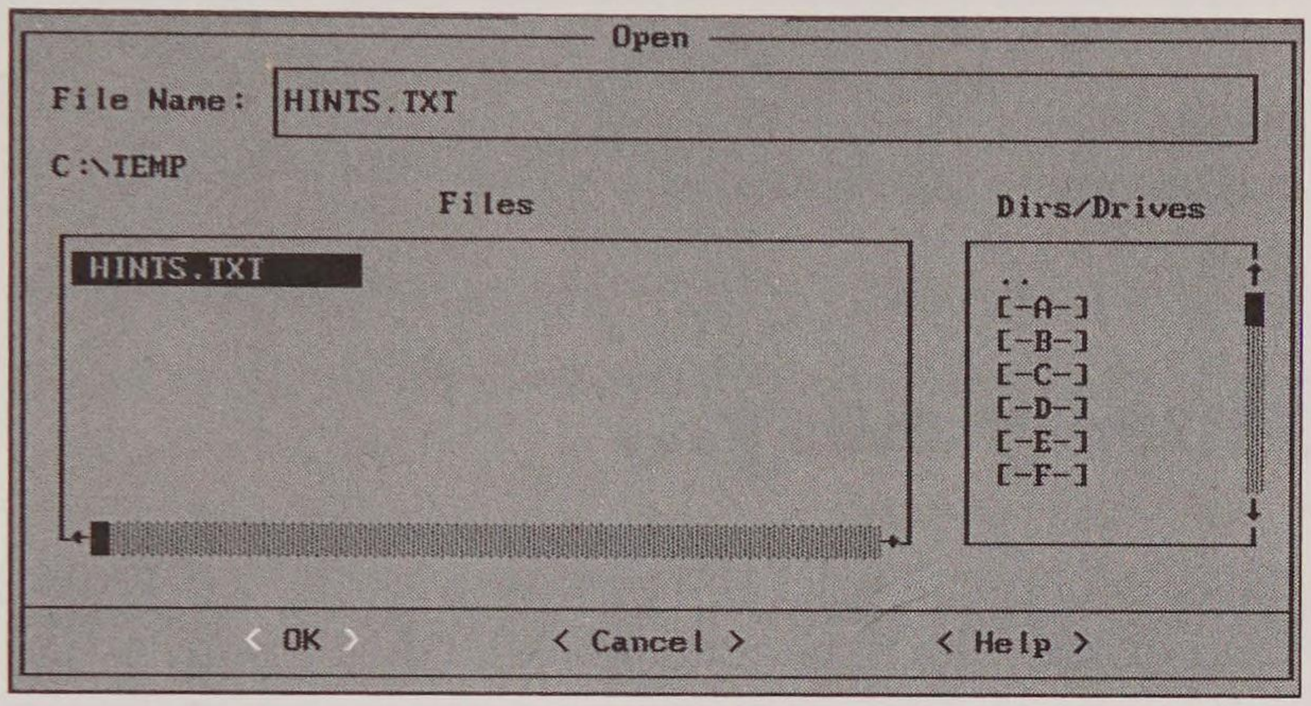


Fig. 19.2
A dialog box is an on-screen form where you can provide the input your program needs in order to complete the command or operation you selected.

A **dialog box** is just a fill-in-the-blank form—you can make choices and selections, and supply information. After you finish making selections in the dialog box, you click OK (or pressing Enter will usually work) to execute the command. It's much like ordering food via fax. You check off the stuff you want and then send in the form. If you want to abandon the command, there is usually a Cancel button in the dialog box as well.

They're easiest with a mouse, but if you insist...

Dialog boxes are easiest to use with a mouse and are found most commonly in programs that have mouse support. However, if you're mouseless, you can still use dialog boxes. The key is to look for a highlighted item (indicated by reverse text, or a different color or brightness) and use the keyboard to move that highlight around the dialog box to make selections.

Typically, pressing the Tab key will move the highlight to a different section of the dialog box. Also, the arrow keys will move the highlight within a section of the dialog box (such as within a list of files in the File, Open dialog box).

Also, look for underlined letters in the names of dialog box options. You can often use the Alt key in combination with that letter to move the highlight to that selection.

Pressing the Spacebar or Enter will normally select the highlighted option. After making all your selections, press Tab as many times as necessary to highlight the OK or Close option. Then press Enter to close the dialog box and complete the command.

Saving is usually easy...

Nearly all programs let you save your work by recording it in a file. You just need to issue the right command and then supply an appropriate file name. Figure 19.3 shows a dialog box where you can designate a file name.

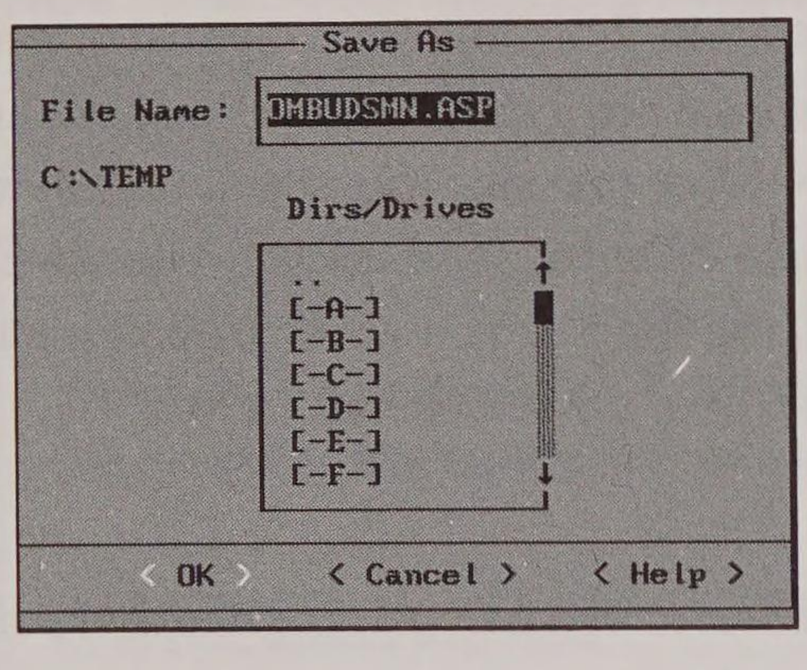


Fig. 19.3
To save a file in most programs you issue the File, Save command (or its equivalent) and then supply a file name and location for the file.

If the program has a menu, look for a File menu and a command such as Save. Sometimes the command to save a file will be a separate command or shortcut key such as Alt-S or Ctrl-S. You might also access the command with a function key. (Some programs use the F10 key for this purpose, but you'll need to consult the manual or a keyboard template to find out for sure.)

A few programs hide the file saving procedure in the process of exiting the document or program. You issue the command to exit or close the document and the program will prompt you to save the file first. If you don't really want to close the document, you can probably abort the exit command after it

saves the file but before it closes the document. Actually, most programs won't let you exit without first having the option of saving the file you're working on (see fig. 19.4).

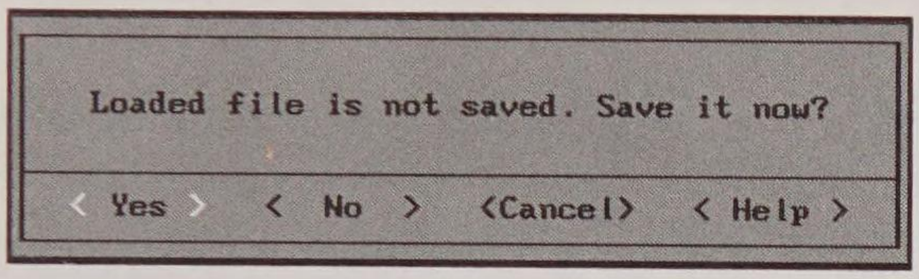


Fig. 19.4
Most programs issue a warning if you try to exit the program without first saving your work.

A few programs provide no way to save a file, because they do it for you automatically every time you do anything in the program.

...but printing is fairly complicated

No doubt, you'll want to put your work on paper. So, you'll want to find any new program's printing commands. Some applications devote a separate menu to commands and options associated with printing. Others place the printing commands on the File menu. But printing is seldom as simple as issuing a Print command.

Before you can print, you must configure your software for the printer you'll be using. Normally, you do that when you install the software. If not, you must do it from within the program. Sometimes you'll find printer configuration included as part of the program's print commands, and sometimes it's a separate setup process.

Once you select the printer, you'll need to address the page setup options—margins and the like—if your program supports such adjustments (most do). If you're willing to accept the program's defaults, you can skip this step, but you should be aware of it nonetheless. Look for commands such as Page Setup, Page Layout, Margins, or Document Format on a File or Print menu. You might find the page setup commands on a Format or Document menu. Occasionally, you'll be able to adjust the options from within a Print dialog box.

After everything's ready, you can use the program's Print command to start printing the document. Don't be surprised if you see another dialog box or screen, such as the one in figure 19.5, where you can specify options such as what pages to print.

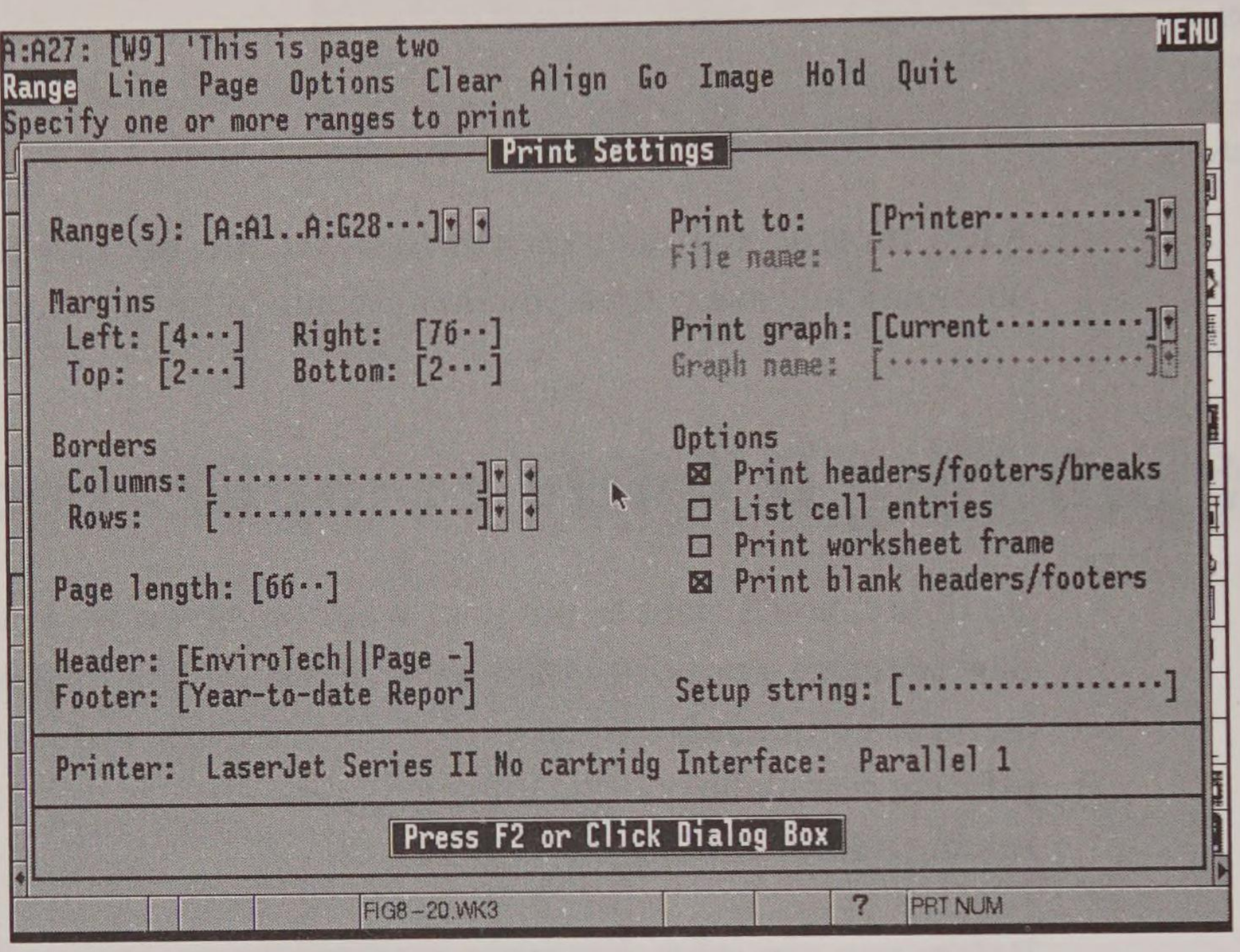


Fig. 19.5
After configuring your printer and setting margins, you can finally select options—such as which pages to print—and print your document.

Getting help

If you need help using an application, you should refer to the software manual. (You knew we were going to say that, didn't you?) It's true that the manual is a good source of help. However, you've got other options as well. One of the best is the on-line help that's included with many programs.

On-line help is available right there on your computer at the touch of a key. Help text shows up on your screen as displayed in figure 19.6. Better still, it's often **context-sensitive**, which means that the help screen opens automatically to the section that pertains to what you're doing in the program at the time.

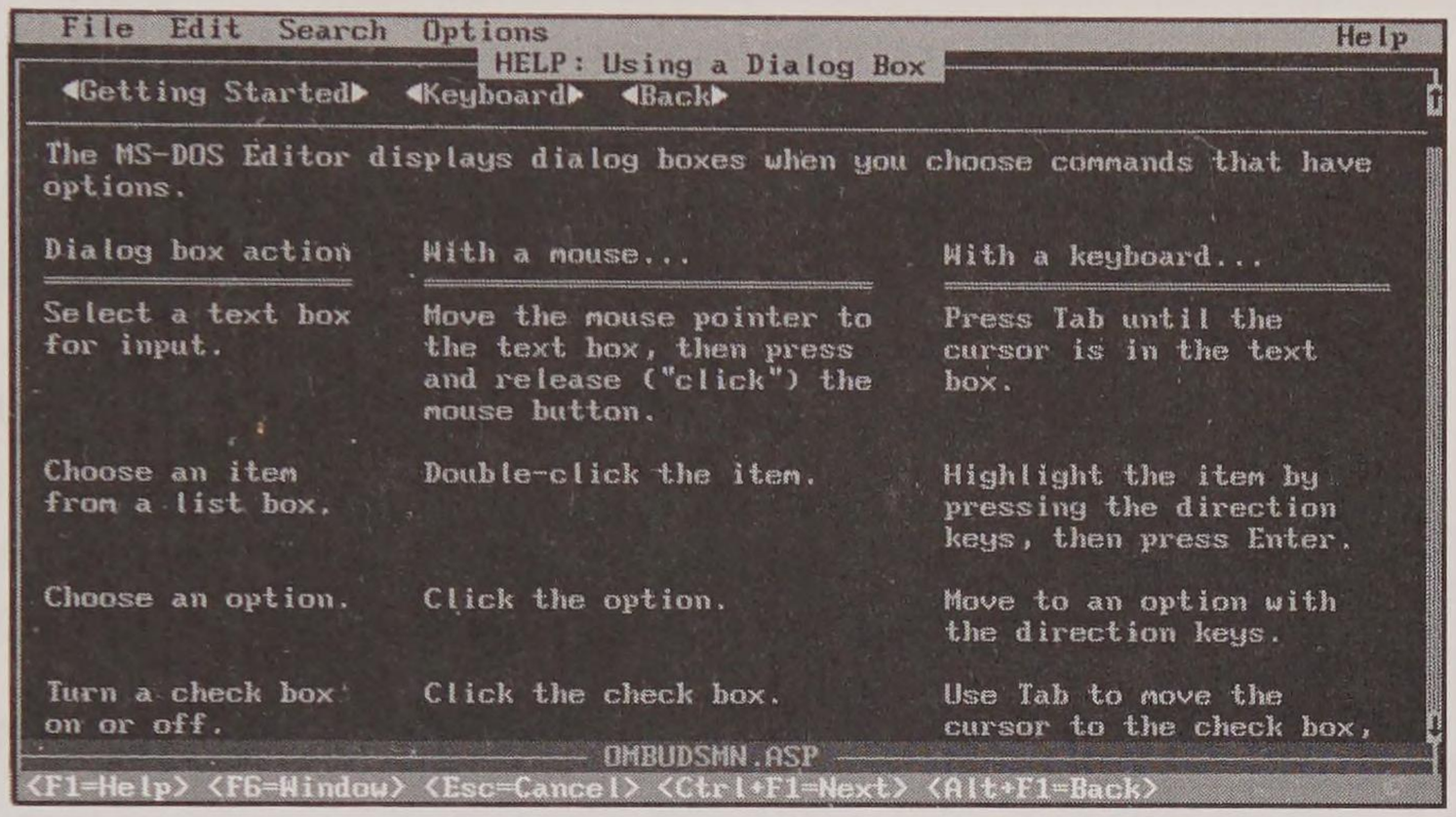


Fig. 19.6
Many programs include on-line help which pops up at the touch of a key to offer instructions on how to use the program.

If the program has menus, Help will often appear as one of the top menu items. In some programs, you press Alt-H or Ctrl-H to access the on-line help.

Many programs use a function key to access on-line help. The F1 key is a common choice. However, before you try pressing F1 for the first time in a new program, you should make sure you won't lose any work if the F1 key does something unexpected.

How do I get outta here?

It's strange how some programs take for granted that you'll enjoy working with it so much that you'll never want to leave. The programmers must have assumed that; otherwise, why did they hide the exit sign?

The wrong way to exit

One thing that you should *never* do is exit the program by turning off the computer. While you're working in the program, many (if not most) programs keep various files open behind the scenes. There might be backup copies of your document, the program's own configuration files, and temporary files of various kinds and descriptions.

Imagine what it would be like if someone flipped a switch and disconnected the ignition while you were driving. Sure, the consequences might be minor, and you could coast to a stop on the shoulder. But if the traffic is heavy, the consequences of an abrupt stop could be serious.

If you turn the computer off while the program is still running, all those open files are left hanging instead of being closed and stored in an orderly fashion. Depending on the program and which files were left open, the program may or may not have trouble getting started again the next time you use it.

{Note}

At the very least, switching off the computer without first exiting a program prevents the program from deleting any temporary files it may have created. In time, the orphaned temporary files can accumulate and eat up precious hard disk space.

I saw one case where a user who habitually turned off the computer without exiting her word processor was unable to save a document to the hard drive or print it. The problem was several megabytes of temporary files that had consumed all available hard disk space. Once the temporary files were removed manually, everything returned to normal, but not before she endured the frustration of several lost documents.

Finding the exit

Some programs post a well-lit sign over the exit in the form of an Exit, Close, or Quit command on the top menu. Other programs place the exit command in a less obvious position. The bottom of the File menu is a common location. You'll also find some programs that use a shortcut key or function key to invoke the exit command. Alt-X or Ctrl-X are common shortcut keys and F10 is probably the most common function key. As always, check the documentation for the program to be sure.

20 Windows! Doesn't Anybody DIR Anymore?

What's a chapter on Windows doing in a DOS book? Actually, DOS and Windows are more closely linked than you might think.

In this chapter:

- What is (are?) Windows?
- How to use the mouse with Windows
- Program Manager basically runs the show
- Where's the exit? How to get out of Windows

DOS and Windows aren't mutually exclusive. In fact, the current versions of Windows *require* DOS in order to run. DOS provides essential services and features that Windows can't furnish on its own. Windows runs "on top of" DOS (maybe "in front of" DOS is a better explanation—you'll see why soon).

In a sense, Windows is like a super sophisticated version of the DOS Shell. It insulates you from the starkness of the DOS command line; but underneath all the pretty screens and icons, DOS is still there getting the job done.

As a result of all this interaction between DOS and Windows, Windows users need a certain familiarity with DOS. And even people who primarily use DOS programs may be working with Windows from time to time.

{Note}

Windows is currently sold in two different versions: Windows, and Windows for Workgroups. Both operate in much the same way. The only real difference between them is that Windows for Workgroups has additional network features not offered by the standard Windows package. All the functions covered in this chapter and the next two apply to either package.

So what is Windows, exactly?

Microsoft Windows is a **GUI** (pronounced *gooey*) **operating environment**. GUI is short for **graphical user interface**, which just means that it lets you (the *user*) interact (**interface** in computer lingo) with the computer through *graphical* things like icons and buttons. In short, you use menus and pictures (called **icons**) to get stuff done, instead of typing a command at the DOS prompt.

{Tip}

Although Microsoft Windows is the proper name for the program, almost no one calls it that. Usually people just say "Windows."

Clicking on a picture to make something happen probably isn't a total alien method. After all, many DOS programs, such as the DOS Shell, have been using menus and other graphical elements for years. Windows just standardizes things.

{Note}

If you still find the "graphical" concept a little perplexing, think of those kiosks at the local record store or museum. You push a button to play a short video or a song, or to hear a recorded message. In Windows, you use the mouse to push the buttons and click the pictures. It's really not very complicated.

Why it's called Windows

Windows takes its name from the thing you see most on-screen: rectangular boxes, called **windows**. Notice the difference in uppercase versus lowercase here. When you see Windows (with a capital *W*), you're reading about the

program called Windows. When you see *windows* (with a lowercase *w*), it's the rectangular areas of the screen.

About the most useful part of Windows is the fact that you can have more than one thing going on at a time. For example, you might be typing a letter in a word processing program like Ami Pro. Then you switch quickly to the Windows Calculator to figure out a price to quote in the letter. Next you might buzz over to Cardfile to get the buyer's address, and so on. If you're used to running DOS-based programs, you might be surprised to find that in Windows you can actually do *all* this stuff *at once*, depending on how much memory your computer has available.

If this **multitasking** thing sounds a bit complicated, just think of the Windows screen as a desktop. You can have several books or papers open at the same time on your desk, right? Just like you can have several projects open at the same time on the Windows desktop.

Each program (each **application**, in Windows terminology) appears on-screen in a separate window, as shown in figure 20.1.

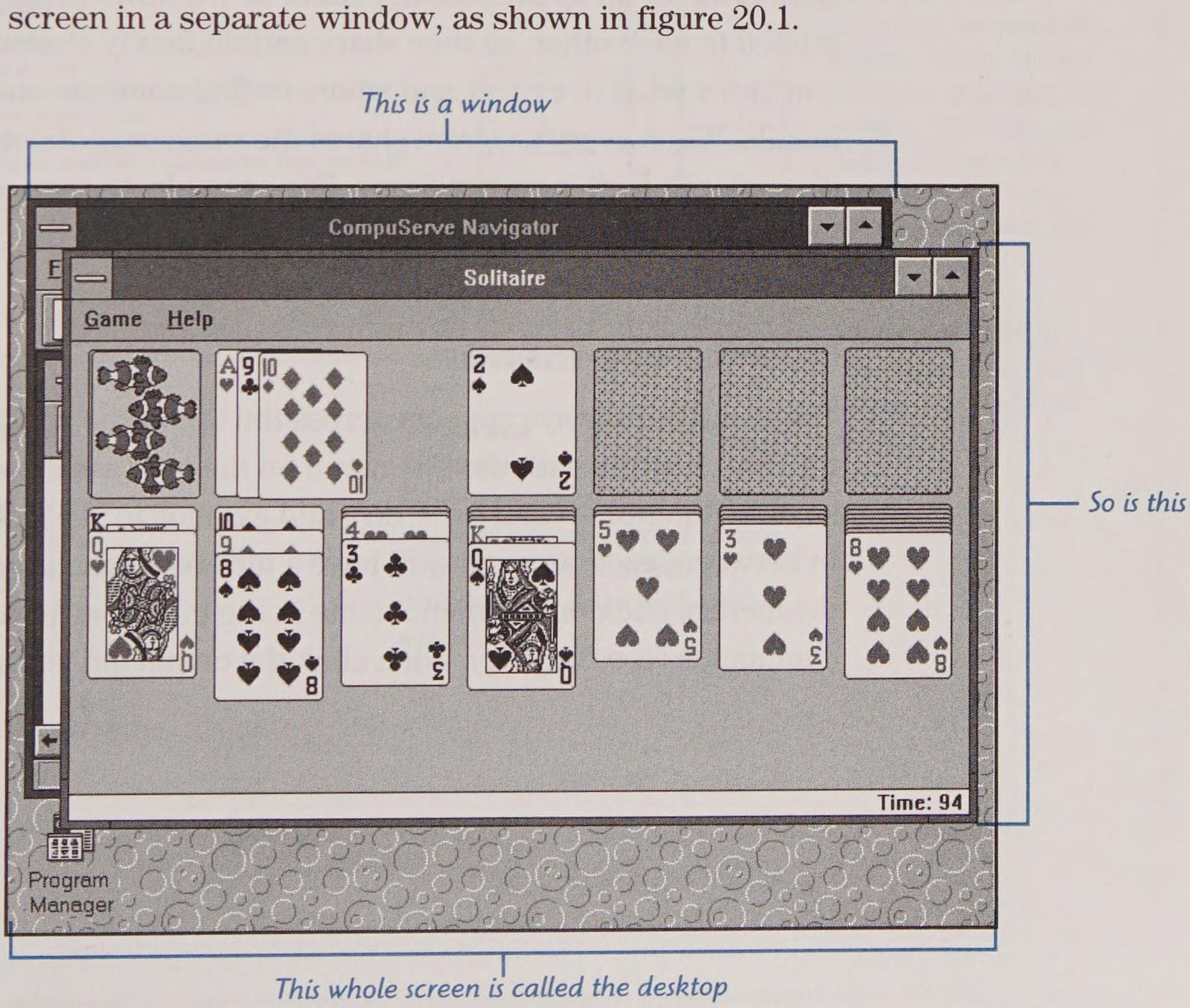


Fig. 20.1
In this example, you have two programs running: the CompuServe Navigator and Solitaire. (Solitaire is one of the games that comes with Windows—they're intended to teach you how to use the mouse, but they're also fun.)

How to start Windows

You start Windows from DOS, much like you would start any DOS program. In a typical configuration, the commands to start Windows would look like this:

```
cd \windows
win
```

Often, the commands to start Windows have been added to the end of your AUTOEXEC.BAT file when you installed Windows. In that case, Windows would start automatically when you boot your computer.

All Windows programs look and act sort of similar

Windows programs conform to a set of programming and appearance standards set up by Microsoft. (Think of Windows programs as all being related to each other, so they share certain family characteristics.) That helps you know what to expect and where to find common elements and commands. When every program shares the same way of doing common tasks, it's easier to learn new programs. For example, to save a file in any Windows program, you always open the File menu and select the Save command.

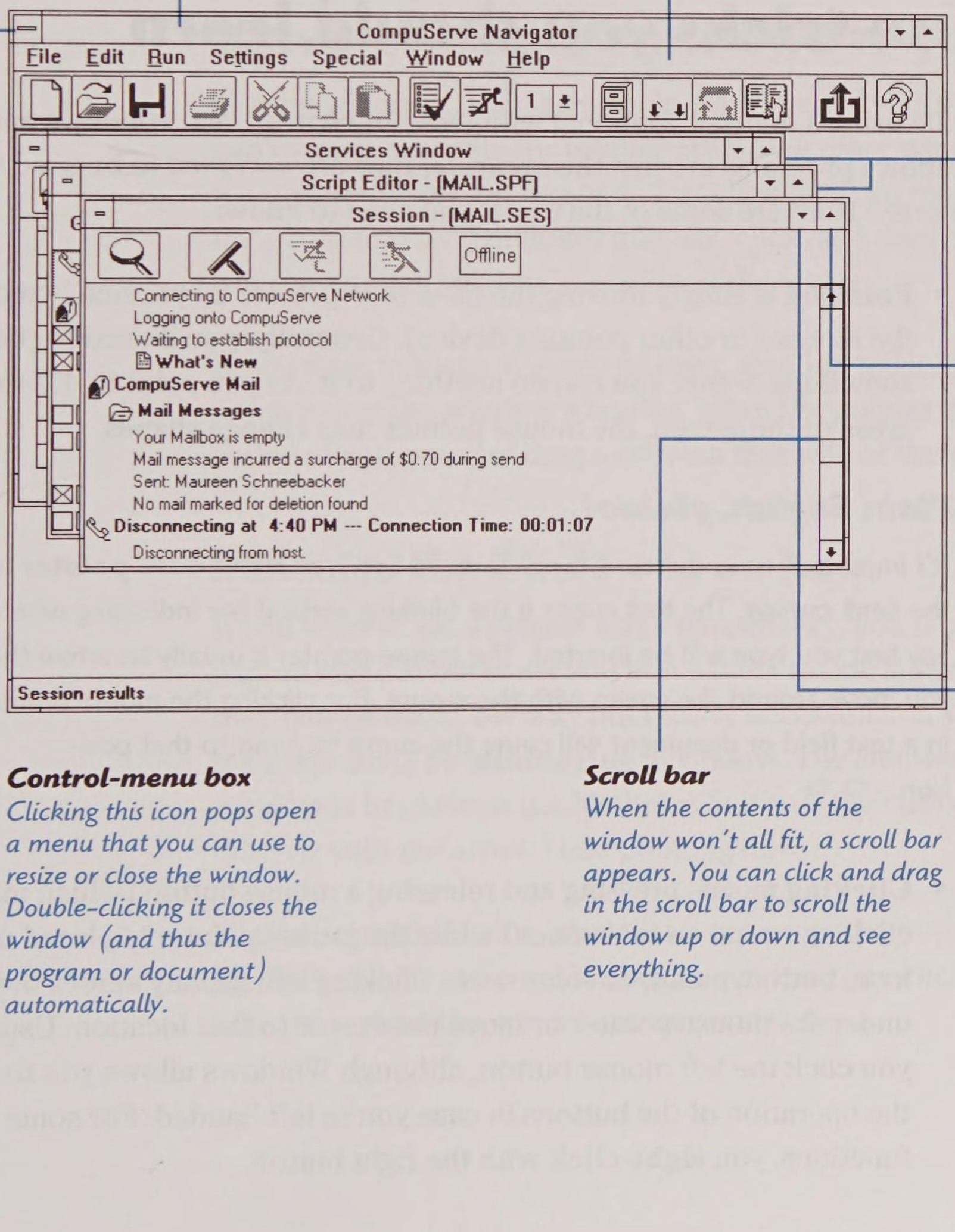
How to use menus

The menu bar always appears across the top of the window, just below the title bar. It starts with the File menu on the left (assuming the program has any file functions—and most do), and extends to the Help menu on the right. In between, each program will have a different assortment of menus. To use the menus, click on the menu name in the menu bar to drop down the list of commands (see fig. 20.2). Then click the command you want.

Basic parts of a window

Title bar
This element identifies which program or file is in the window.

Menu bar
This is where the program displays the menus you can use to run the program.



Borders
Each window is surrounded by a border that encloses the document you're working on as well as the title bar, menus, and so on.

Maximize button
Click here to make the window fill the screen. After you maximize the window, the Maximize button changes to a Restore button, with arrows pointing up and down.

Minimize button
Click here if you want to reduce the window to just an icon.

Control-menu box
Clicking this icon pops open a menu that you can use to resize or close the window. Double-clicking it closes the window (and thus the program or document) automatically.

Scroll bar
When the contents of the window won't all fit, a scroll bar appears. You can click and drag in the scroll bar to scroll the window up or down and see everything.

Fig. 20.2 You can also access menus by pressing Alt plus the key corresponding to the underlined letter in the menu name. For example, Alt-F opens the File menu.

Stupid mouse tricks you should learn

While using a mouse is optional with most DOS programs, Windows and Windows programs are just the opposite; they are *designed* to be used with a mouse! Here are some of the tricks you need to know:

- **Pointing** is simply moving the on-screen pointer by physically moving the mouse (or other pointing device). Generally, you'll need to point to something before you can do anything to it. As you point to different areas of the screen, the mouse pointer may change shapes.

Plain English, please!

It's important to understand the difference between the **mouse pointer** and the **text cursor**. The text cursor is the blinking vertical bar indicating where any text you type will be inserted. The mouse pointer is usually an arrow that you move around the screen with the mouse. But clicking the mouse pointer in a text field or document will cause the cursor to jump to that position.

- **Clicking** means pressing and releasing a mouse button (which makes a clicking sound on most mice) while the mouse pointer is placed on an icon, button, menu, or some such. Clicking will usually **select** the item under the mouse pointer or move the cursor to that location. Usually you click the left mouse button, although Windows allows you to switch the operation of the buttons in case you're left-handed. For some functions, you **right-click** with the right button.

- You can probably guess what **double-clicking** means—to click twice in rapid succession. A double-click will often select something and perform some standard operation. For example, double-clicking on an icon may start a program.
- **Dragging** is when you press and hold down the mouse button while you move the mouse. Usually, this moves the item that's under the mouse pointer. You drag to move icons and windows, to resize things, and to select an area such as a block of text in a word processor.

Move or resize windows as you like

Moving windows is the electronic equivalent of shuffling papers. Windows can overlap, partially (or totally) obscuring other windows. To bring a window to the top of the stack, just click on it. To move a window, position the pointer on the window's title bar, click, and drag it to a new location. You can even drag a window partially off the screen.

If you want to make a window larger, smaller, taller, or shorter, position the pointer over the window's border. When the pointer changes to a double-ended arrow, you can drag to stretch that side of the window.

Minimize the window to an icon

If you want to set a project aside temporarily, you might consolidate all the papers into a small stack and move them to one side of your desk where they will be out of the way but readily accessible. In Windows, you can do the same thing by **minimizing** a window. The simplest way to minimize a window is to click on the Minimize button—the button on the right end of the title bar with the arrow head pointing down.

Minimizing reduces the window to an icon at the bottom of your desktop (see fig. 20.3). When you need it again, a quick double-click on the icon is all it takes to restore the window to its normal size.

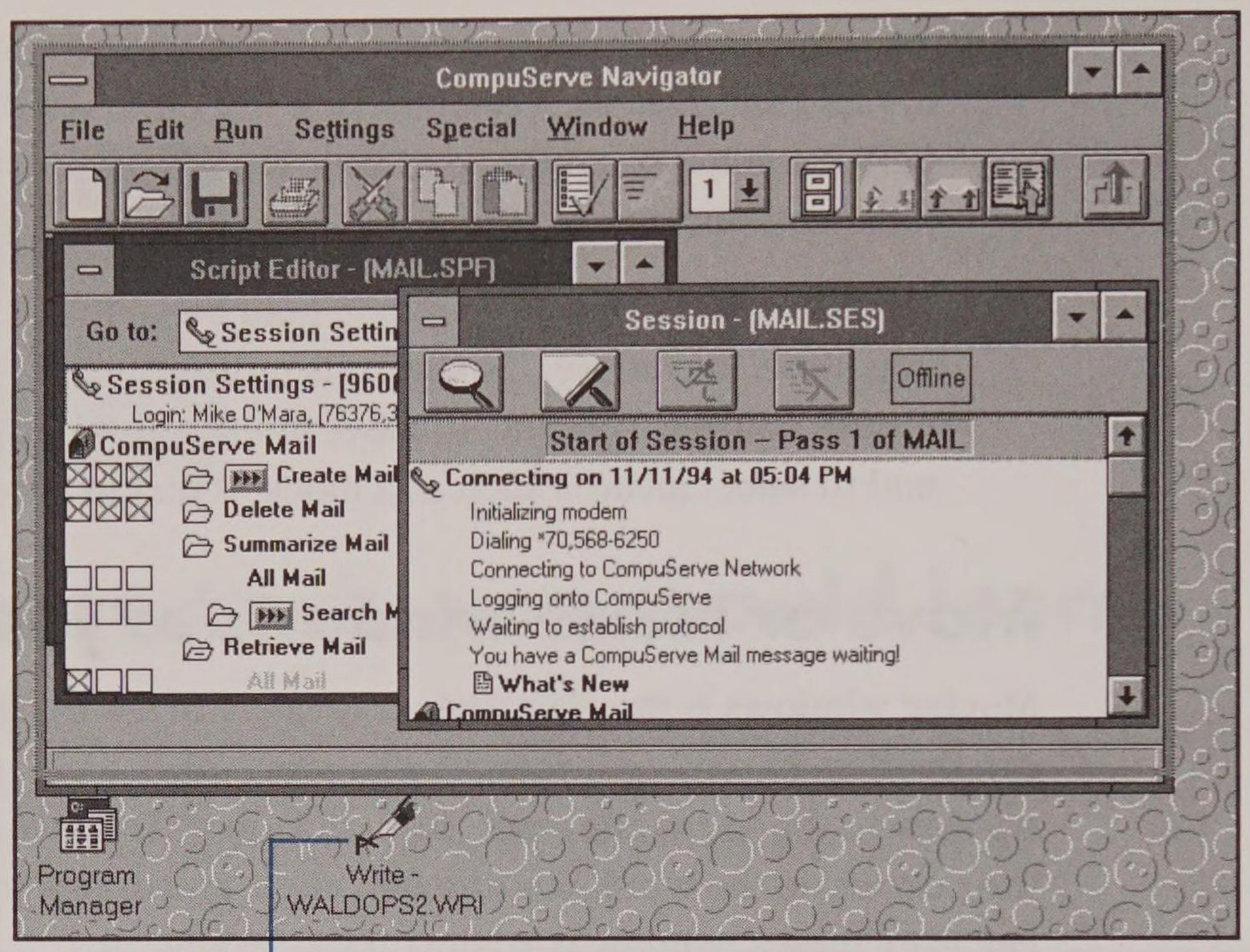


Fig. 20.3
The Windows application is still running and the document you were working on is still open.

Maximize it to full-screen size

When you want to concentrate on one program, maximizing its window is the way to go. **Maximizing** a window does just what the name implies; it enlarges the window to occupy the maximum available space. Clicking the maximize button—the up arrow in the title bar—will cause the window to fill the entire screen as shown in figure 20.4.

{Note}

All the windows and icons that were on your desktop before you maximized this window are still there; they're just out of sight behind the maximized window. It's like spreading out a big piece of paper (such as a map or blueprint) over a cluttered desk.

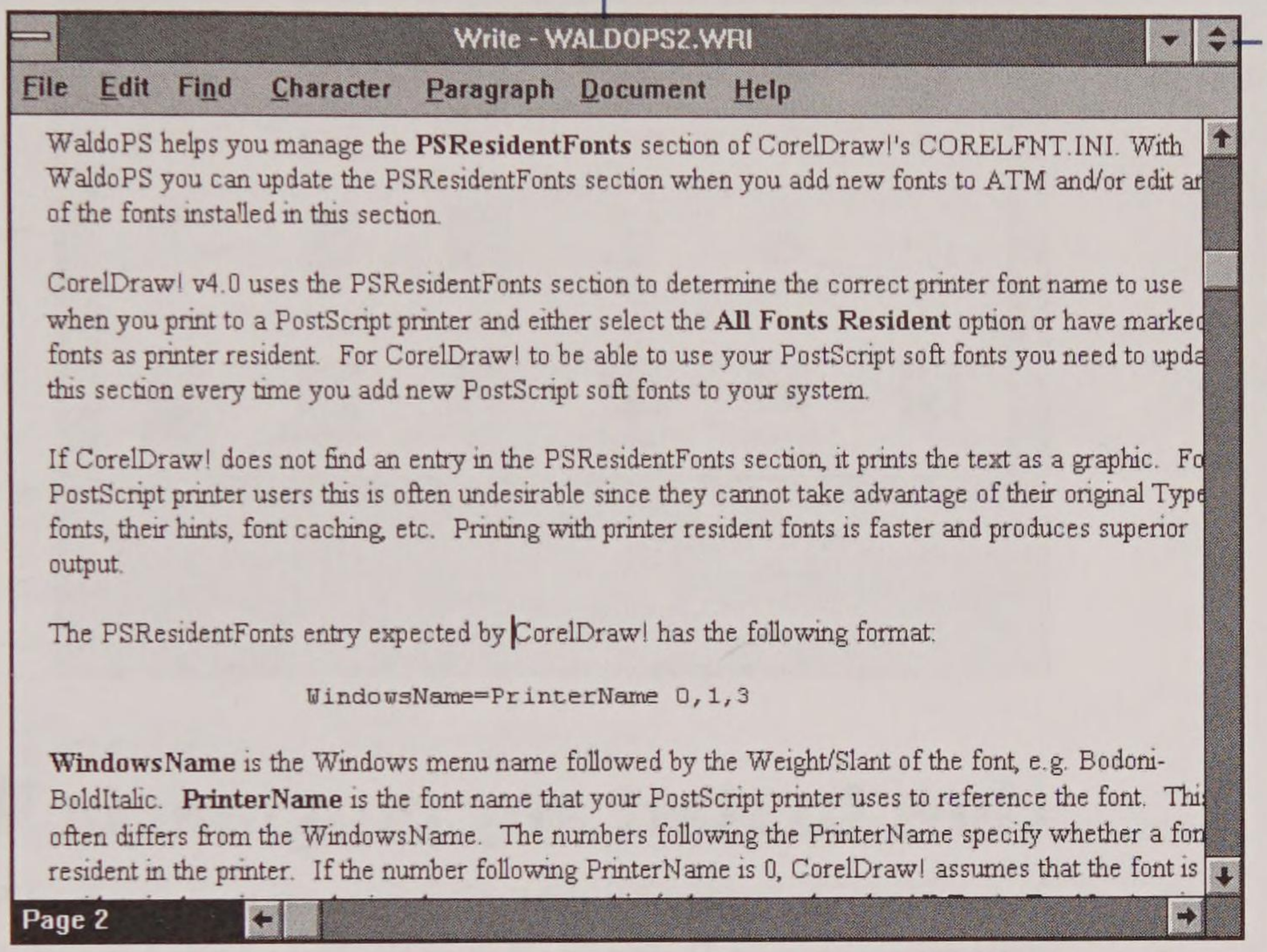


Fig. 20.4
Maximizing an application may make it fill the screen and look like it's the only program running, but there are other windows lurking out of sight behind this one.

Restore a maximized window

Restoring a window returns a minimized or maximized window to its previous size. If the program is minimized, restore it by double-clicking on the icon. To restore a maximized window, click on the **Restore button**—the double-headed arrow button in the upper-right corner of the window.

Hello, I'm your Program Manager

In Windows, you don't see a DOS prompt or command line—no familiar place to type the commands that would launch a program. Instead, the Windows **Program Manager** provides access to commands and programs. You start most Windows programs by double-clicking icons in **group windows** within the Program Manager window (see fig. 20.5).

Program Manager is your home base in Windows. It's the one Windows program that's *always* running.

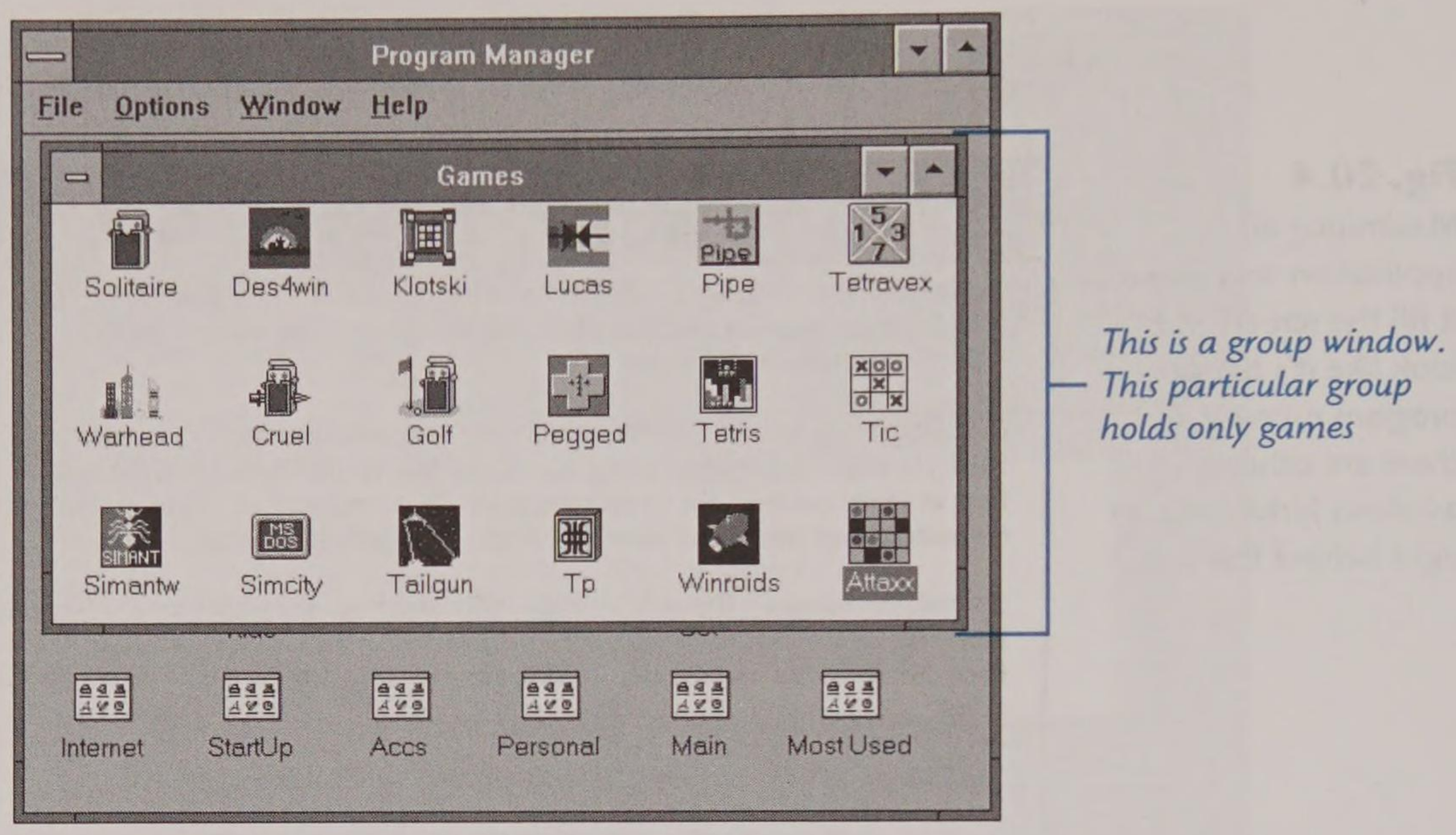


Fig. 20.5
Obviously, Windows doesn't come with all these games. This set is where the author spent his money!

How to start any program in Windows

To start a Windows program, all you need to do is double-click on the program's icon in Program Manager. The procedure is always the same for all programs:

1. Open the Program Manager window. (I usually keep Program Manager minimized, so the first step is to restore the Program Manager window to its normal, working size.) If Program Manager is already open on your desktop, all you'll need to do is click on the window.
2. Click the group window containing the icon for the program you want to start. If the group window is minimized, double-click the icon for that group. For example, you'd double-click the Main icon if you wanted to start the Windows File Manager, which is contained in the Main group.
3. Start the program by double-clicking on the program icon.

Q&A

Help! I just opened Windows and my Program Manager takes up my whole screen. I can't find any other windows.

If Program Manager monopolizes your screen when you start Windows, it may be maximized. Look for the telltale double-headed arrows of the Restore button in the title bar and click on the Restore button if it's showing. Program Manager is one application that you don't usually want to run maximized because it tends to hide other windows. Likewise, having one of Program Manager's group windows maximized makes it hard to select program icons from other windows.

Quitting Windows

When you've spent enough time looking through Windows, it's time to find the door. You're wondering how to get out of all these windows? Choosing the File, Exit command will almost always quit the program and close the window. But there's also a quicker technique. You can issue the same command by double-clicking the **Control-menu box** or by pressing Alt-F4.

If you want to exit a program that's minimized, clicking the program's icon will open the Control menu and you can issue the Close command to exit the program.

So much for quitting an application, but how do I get out of Windows? Just exit Program Manager. When you do, Windows will pop up the Exit Windows dialog box so you can confirm that you really want to get out of Windows.

21 Using the Windows File Manager

File management is an inherent part of DOS. But you won't find directory lists laying around on the Windows desktop!

In this chapter:

- How do I start File Manager?
- All the basic File Manager stuff you need to know
- Copying and moving is really *easy* when it's visual
- But I want to copy more than one file at a time!
- You can even delete or rename files and directories

Working in DOS is like working in a large corporate file room. You can leave the file room to work in another room (a program), but you always return to the file room at the end. Windows, on the other hand, gives you an office with a desk as your home base. If you need to work with files, you'll have to go down the hall to the file room (the Windows File Manager).

How to start File Manager

File Manager is a program, and just like any other Windows program, you start it from Program Manager. From Program Manager, you open the Main program group. There you'll find File Manager (the icon looks like a file cabinet), as shown in figure 21.1. Double-click on the File Manager icon to launch the program.

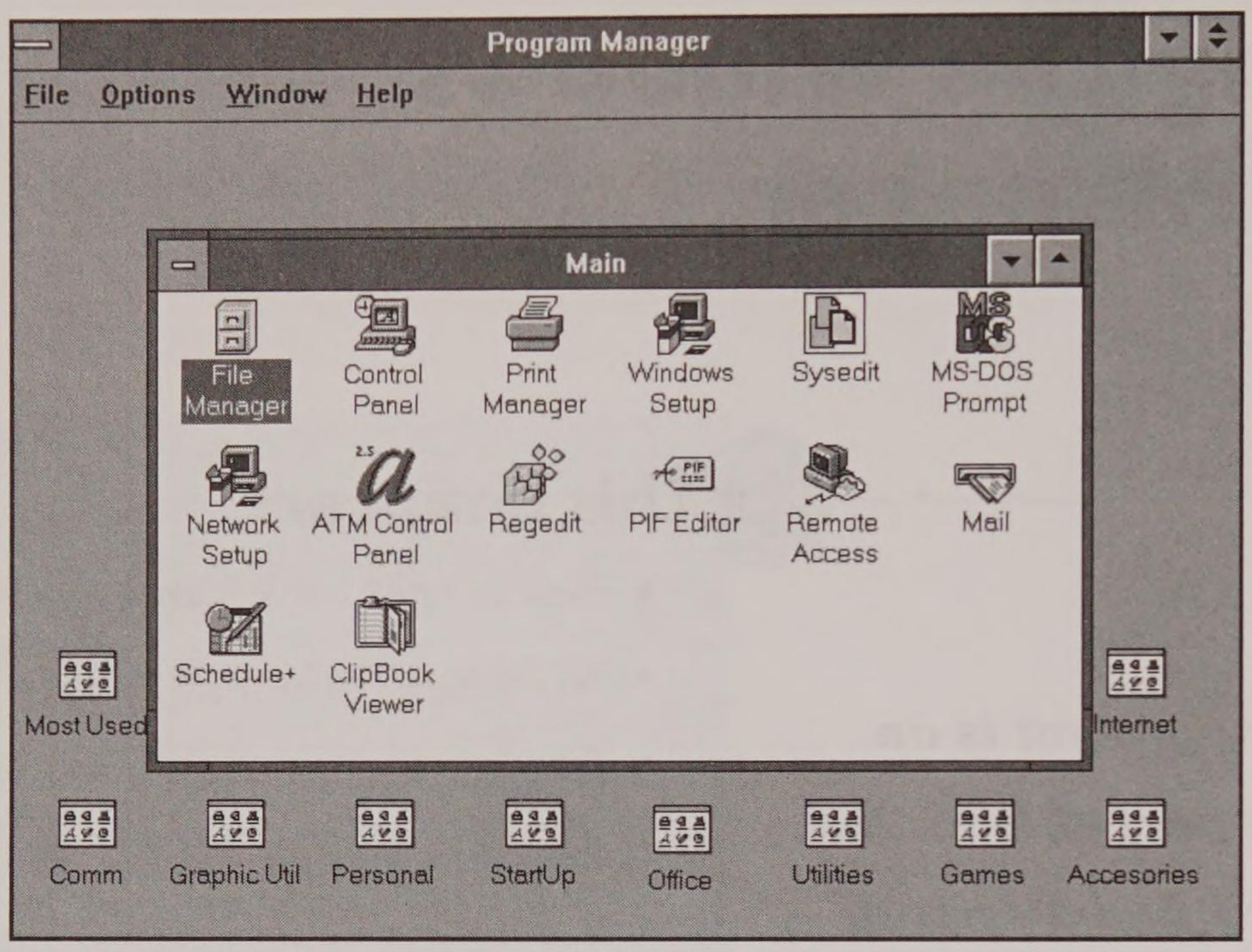


Fig. 21.1
The File Manager icon looks like a file cabinet, and you'll find it in Program Manager's Main program group.

When you open File Manager, you're greeted with a graphic representation of the directories and files on your disk. Wow, this looks complicated! But you probably found the library at school intimidating at first. What with all those stacks of books, how would you ever find anything? Eventually, you learned how things are organized, and you can now go into most any library and find what you want with just a quick orientation.

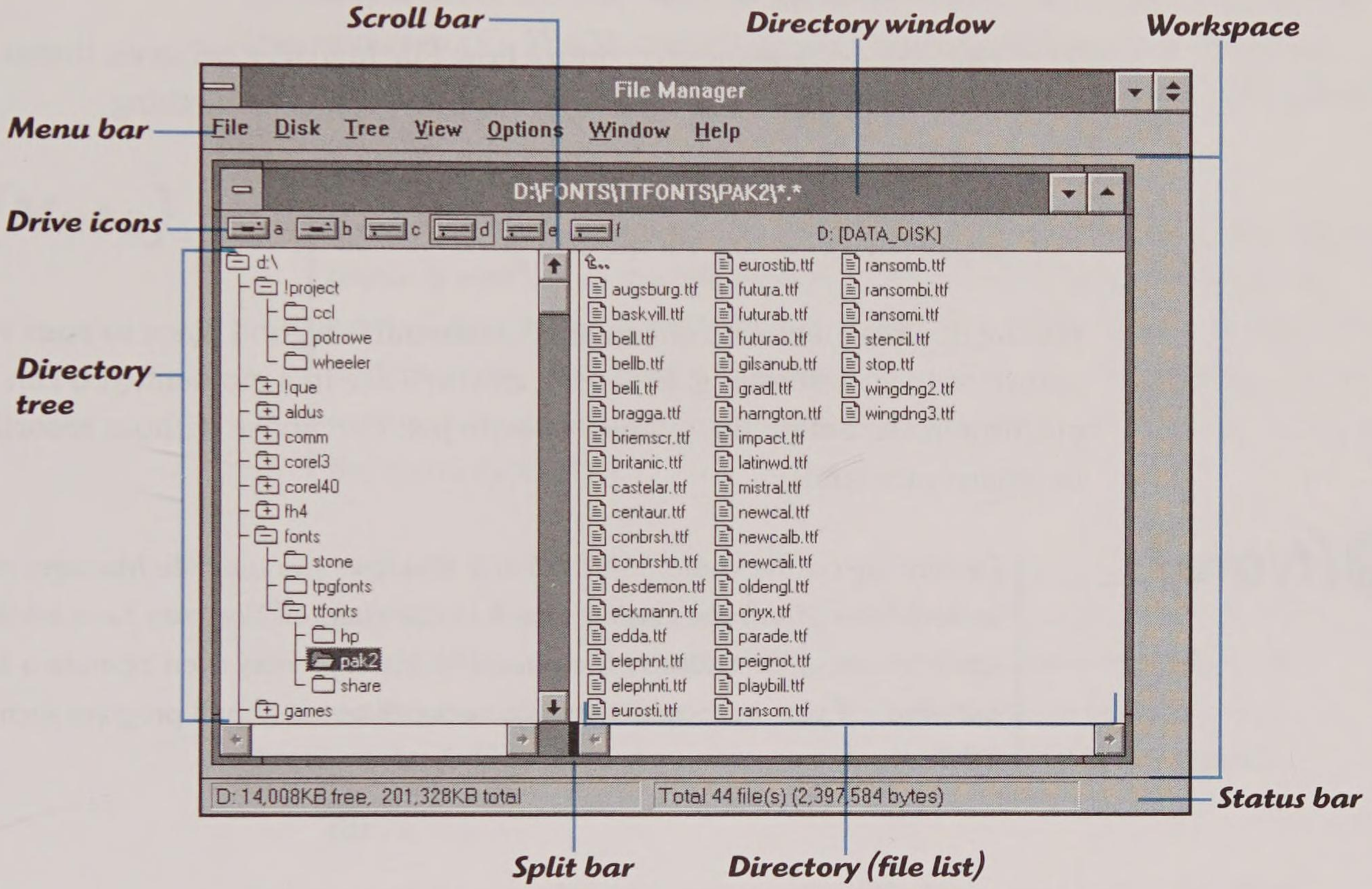
You already know about file names, extensions, and directories. So you already know the computer's equivalent of the filing system! Now follow us on the orientation tour of File Manager.

File Manager basics

File Manager, like all Windows programs, has a menu bar where you can pull down menus of commands that let you manipulate files and control File Manager itself.

- File—file and directory operations such as Copy, Delete, Rename, and Create Directory
- Disk—disk operations such as Format and Label

Holy cow! What is all this?



The File Manager window may look complicated, but all those icons have a logical purpose. The icons beside each directory and file name can tell you something about the file or where the directory fits in the tree:

- This is a directory with no subdirectories.
- The plus sign (+) on a folder indicates that there are subdirectories, but they aren't expanded, so you can't see them in the left window. To have File Manager indicate those directories with a plus sign in the directory icon, make sure to open the View menu and check Indicate Expandable Branches.
- When the subdirectories are visible, you see a minus sign (-) on the folder.
- Programs you can start from File Manager (or DOS) are indicated with this symbol.
- Any file containing data has this symbol...
- ...unless File Manager knows which program uses that extension. Then you get this symbol.
- This symbol indicates a system file. Don't fool around with these unless you know what you're doing.

- Tree—options to control the appearance of the directory tree display
- View—options to control directory sorting and how much detail shows in the directory display
- Options—commands to control how File Manager behaves; things like how much confirmation to request when you do something
- Window—commands to select and arrange windows
- Help—answers to your questions

Pulling down a menu and choosing a command is a good place to start when you want to do something. However, as you'll see in a moment, you can perform most routine file operations with just the mouse without resorting to menu commands.

{Note}

Depending on the versions of DOS and Windows you use, File Manager may look different from the version shown in this chapter. You may have additional icons or menus, or options on menus. File Manager may even operate a bit differently if you are hooked up to a network or use a shell program such as PC Tools.

The disk drive icons

In File Manager's **workspace**, you'll find one or more directory windows. In each, there's a row of icons representing your computer's disk drives. To show a directory listing of a drive in the window, just click on the corresponding drive icon. This is roughly equivalent to typing the drive name in order to switch drives in DOS, like this:

```
a:
```

or

```
c:
```

All you have to do is click the icon for the drive you want. Easy!

What does your directory tree look like?

The directory window is split, and the left portion of the window shows the directory tree for the selected drive (unless you've chosen to view only the tree or directory). File Manager's graphic representation of the directory makes it easy to see directories and subdirectories, arranged like the levels of an outline.

{Note}

If you have more than a few directories on your drive, the entire directory tree probably won't fit in the left portion of the directory window. But not to worry. If they're needed, File Manager will add scroll bars to the directory tree portion of the window to let you scroll through the tree. Interestingly, these scroll bars are completely independent of the scroll bars in the other portion of the directory window.

Like the outline feature in many word processors, you can expand and collapse a directory to show or hide the subdirectories it contains. Just double-click on a directory to expand (or collapse) that branch of the directory tree. This is the equivalent of the following DOS command:

dir /s

But the results are a lot easier to read in File Manager than at the DOS prompt because you can scroll through the list.

And what's inside each directory?

A single click on a directory icon in the directory tree lets you see (in the right-hand portion of the directory window) a list of the files in the directory you selected. Basically, this is a graphic version of what you get with the DIR command in DOS.

You can open more windows, too

So far, we've had only a single directory window open. However, file operations such as copying and moving require a source *and* a destination. It'll be much easier to copy and move files between drives and directories when you can see separate windows for both the source and destination directories. This feature of File Manager really simplifies working with multiple directories—much easier than using COPY and MOVE at the DOS prompt!

To open another directory window, double-click on a drive icon (or choose Window, New Window). File Manager will open another directory window, as shown in figure 21.2.

(Tip)

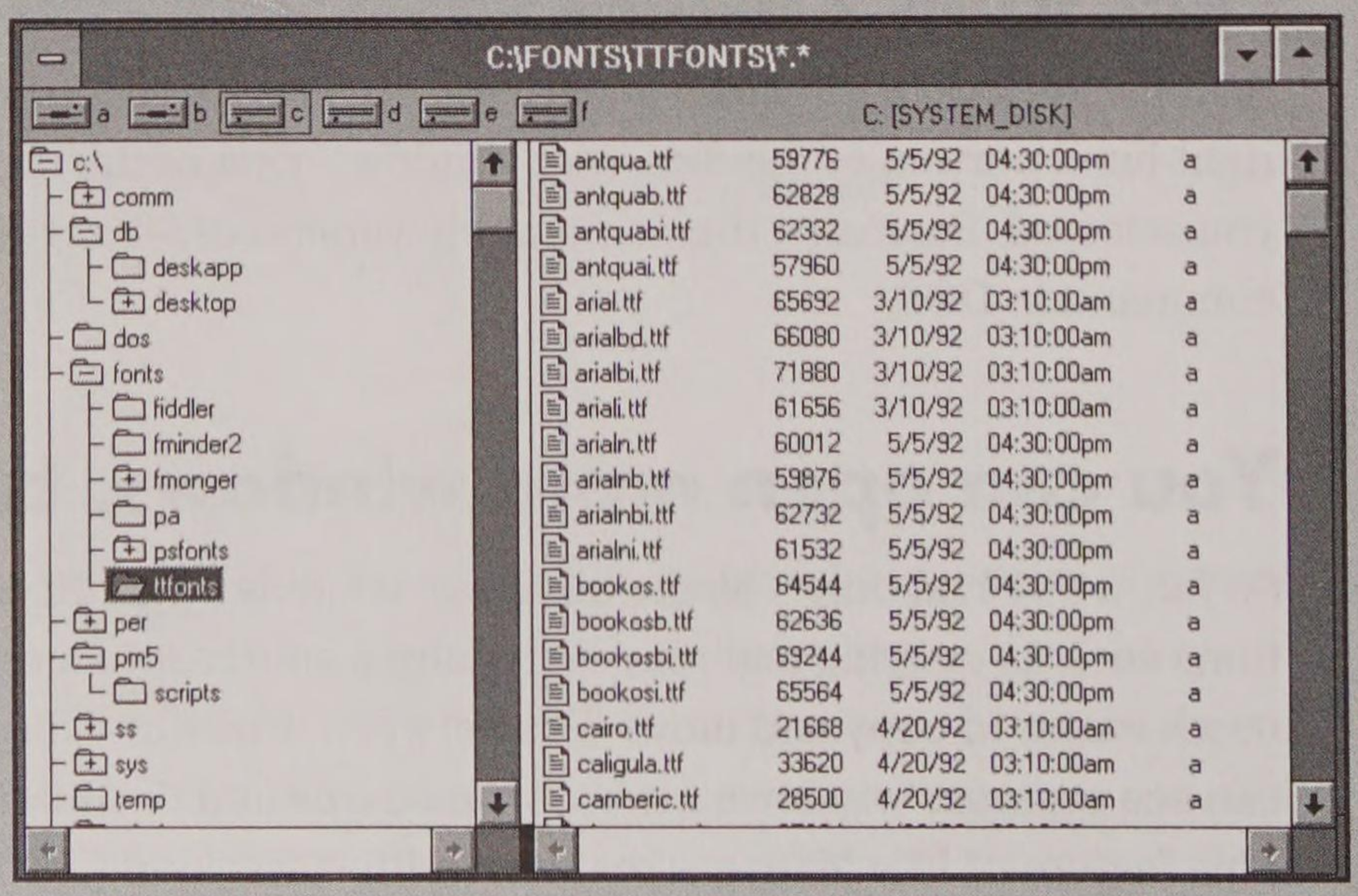
If the title bar of the new directory window has a 2 after the path, it means that it's the second directory window to show the same directory information. If you want another directory on the same drive, just scroll through the directory tree and click on the desired directory icon.

So what do you want to see?

You can control how File Manager shows you the files in a directory. To see just file names—which are shown in most of the figures in this chapter—choose View, Names. File Manager will show the file names in several rows and columns in order to fit as many as possible in the directory window.

If you want to see more file details, choose View, All File Details. If you choose this option, you get one file per line with columns to display details such as file size, last edit date, and even attributes as shown in this figure.

If you don't need *all* the details for each file, choose View, Partial Details. Then specify which information you want to see.



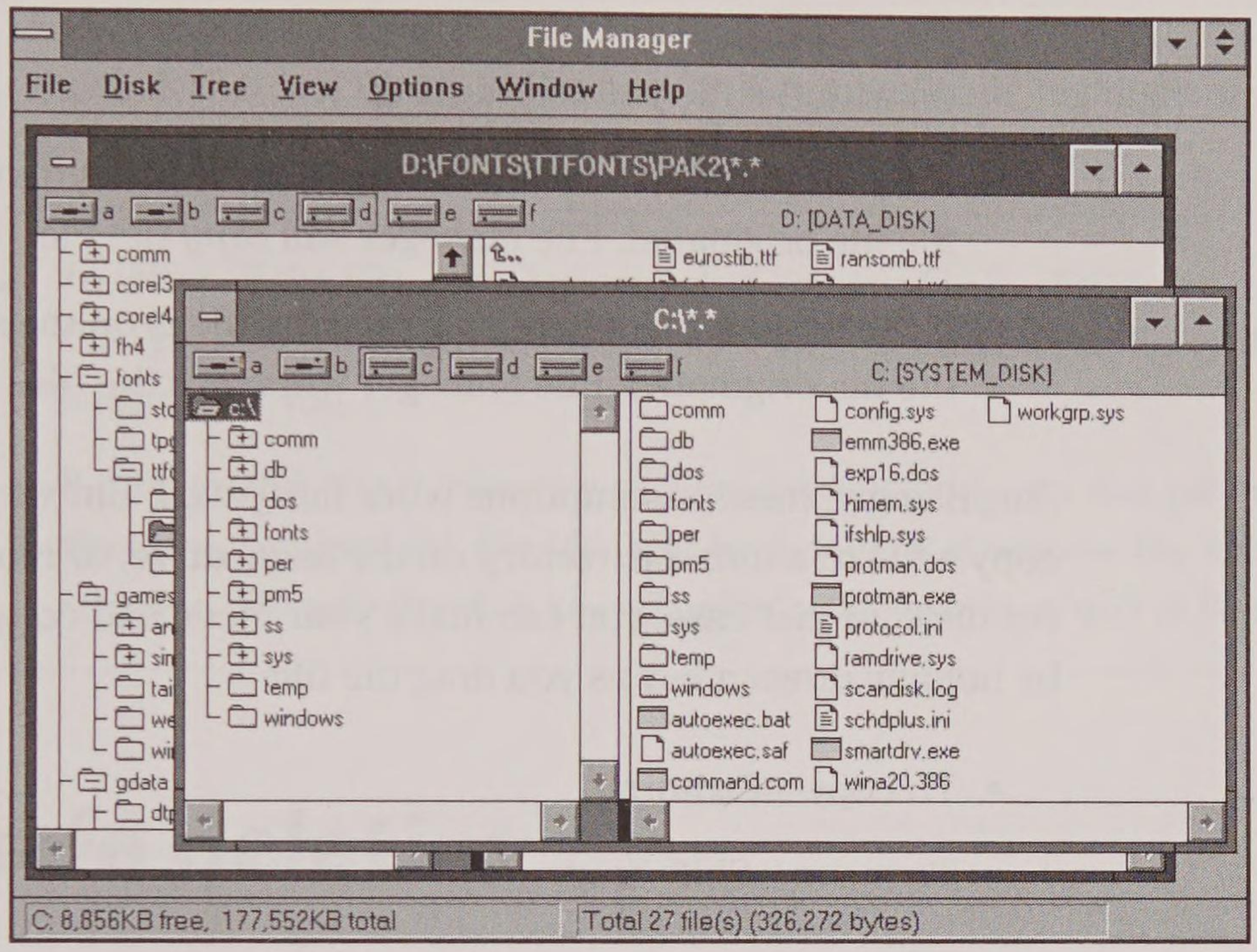


Fig. 21.2
Double-click on a drive icon to open a second directory window so you can see both the source and destination for your file.

Q&A

I don't see my other window anywhere.

If you don't see separate directory windows in File Manager, it's probably because one directory window is maximized, occupying the entire workspace. Look for a Restore button (a double-headed arrow) located at the right end of the menu bar. Clicking it will restore the directory to a normal window that you can resize and move within the File Manager workspace. Another method is to choose Window, Tile. Windows will then divide the workspace to accommodate both windows.

Easy copying and moving

File Manager takes advantage of Windows' graphical interface with a technique called **drag-and-drop** for copying and moving files. Once you try it, you'll probably find the process pretty natural:

1. Click on a file in a directory window. That **selects**, or **highlights**, the file, and it appears in a different color.
2. Drag the selected file to a drive icon or to another directory window and release it.

3 File Manager then makes some assumptions about what you want it to do with the file you're dragging.

   If the destination where you drop the file is a different drive from where the file originated, File Manager will *copy* the file.

   If the destination where you drop the file is on the same drive as where the file originated, File Manager will *move* the file.

Surprisingly, these assumptions work fairly well. But what if you want to copy a file to another *directory* on the same drive, or move a file to a different disk? In that case, you can make your move and copy instructions explicit by holding down a key as you drag the file:

- To copy—Ctrl-drag
- To move—Shift-drag

Another way to be sure whether you copy or move a file is to use the menu commands. To copy a file, select it and then choose File, Copy (or press F8). File Manager will open a dialog box where you can enter a destination path and then click OK to copy the file. The process is the same to move a file, except that you choose File, Move (or press F7).

How to work with groups of files

You don't have to work with only one file at a time. File Manager lets you select groups of files and manipulate all the selected files at once.

To select several files in a directory window, click on the first file and then hold down the Ctrl key while you click on other files to select them. Holding down the Ctrl key prevents each new selection from *deselecting* the previously highlighted files. Once they are selected, you can drag the entire group as a block or select a command and it will affect every selected file.

If you need to select a bunch of files that are in a *contiguous* block in the directory window, you don't have to go down the list Ctrl-clicking each file. Instead, you can select the first file in the list, scroll down the list to the last

file in the group (using the scroll bar), and hold down the Shift key as you click that last file. File Manager will automatically highlight all the files in between.

(Tip)

To select all the files in a directory, select any one file by clicking on it and then press the slash (/) key. File Manager will highlight all the files in the directory for you.

But be careful. If your directory contains subdirectories, you may get more than you bargained for. File Manager tends to treat directories like files, and selecting "all" with the slash key will select subdirectories as well as files.

Practice safe deleting

The procedure for deleting files and directories is simplicity itself. You select the file, group of files, or directory, and press Delete or choose the File, Delete command. File Manager opens the Delete dialog box shown in figure 21.3, where you can modify the command. Click OK to proceed.

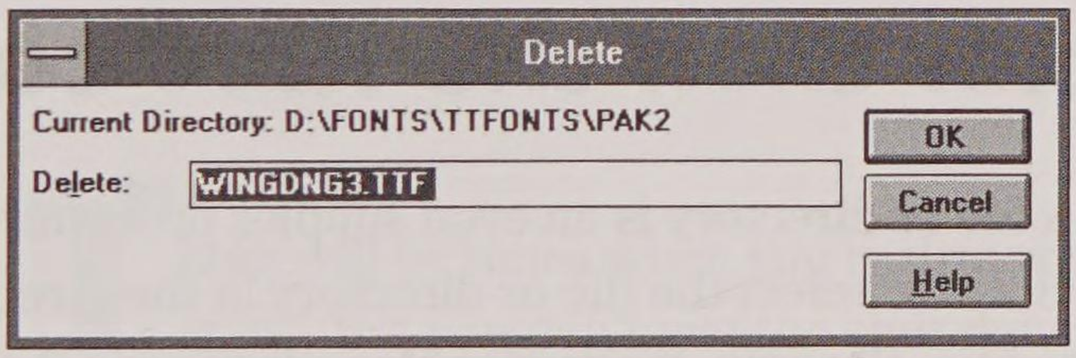


Fig. 21.3
To delete a file, select it in the directory window, and then press Delete to open this dialog box.

But what's this? Your file's not gone yet. Instead, File Manager opens another dialog box, as shown in figure 21.4, asking you to confirm that you *really* want to delete the file. This time, when you click OK, the file will be deleted.

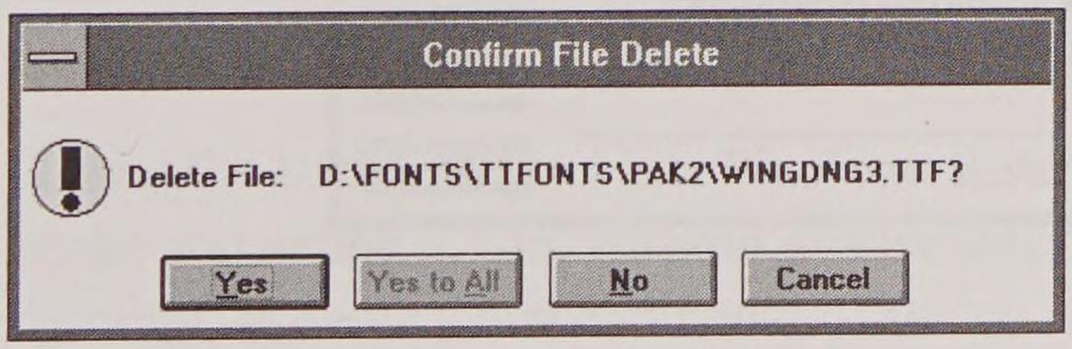


Fig. 21.4
File Manager likes for you to confirm actions like deleting files.

(Tip)

Once you become confident of your file management skills in File Manager, all those confirmations can become a bit annoying, and they definitely slow you down. Choose Options, Confirmation. File Manager will open a dialog box where you can select what kinds of actions you want File Manager to require confirmation on before executing the command.

In File Manager, the same delete command works on both files and directories. There are no separate Delete (DEL) and Remove Directory (RD) commands as there are in DOS. The only difference between deleting files and directories is yet another dialog box for confirming your intentions when you delete a directory.

<Caution>

File Manager lets you delete a directory *and all the files it contains*! This even extends to its subdirectories. While it's convenient not to have to empty a directory first before you can remove it, it's dangerous as well. If you're not careful, you could wipe out an entire branch of a directory tree with one command.

And this is better than the REN command

Renaming a file or directory is an even simpler procedure in File Manager than in DOS. First, select the file or directory in the directory window and then choose File, Rename. When File Manager opens the dialog box shown in figure 21.5, type the new file name in the To field of the dialog box and click OK.

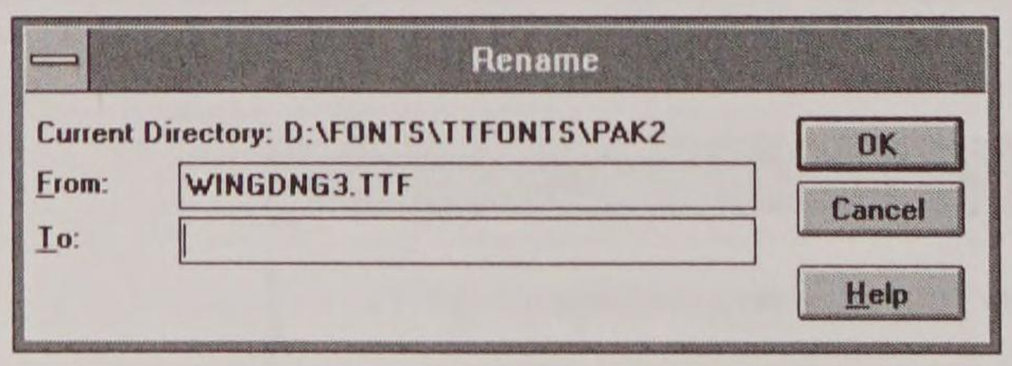


Fig. 21.5
If the files share some naming characteristics, you might be able to use wild cards, too. See the Help documentation for details.

File Manager's Rename command works equally well on both files and directories. Unlike DOS, you don't have to use a different command to rename directories. (Using the MOVE command to rename directories never made much sense to me anyway.)

Sneaking Back to DOS from Windows

In this chapter:

- Now that you have Windows, why would you ever use the DOS prompt?
- Okay, I need the DOS prompt after all. How do I get there from here?
- How to get back to Windows
- Don't try this stuff from Windows

Believe it or not, now that you're comfortable with Windows, it may be time to go back to DOS (for a little while)!

There will be times when you realize you need to run a DOS command, but you don't want to shut down Windows. For example:

- You need to use a DOS utility that's not compatible with Windows.
- You want to use a DOS command, like MEM, for checking your system memory.
- You want to use DOS Help to check the syntax for a command.

Using the DOS prompt while Windows is running is kind of like having your cake and eating it, too. Without any trouble, you can switch to the DOS prompt, execute a few commands, then go right back to Windows.

How to get to the DOS prompt from Windows

When you install Windows, it creates an icon for the DOS prompt and puts it in the Main program group (see fig. 22.1). If you have no idea what I'm talking about, go read Chapter 20, "Windows! Doesn't Anybody DIR Anymore?"

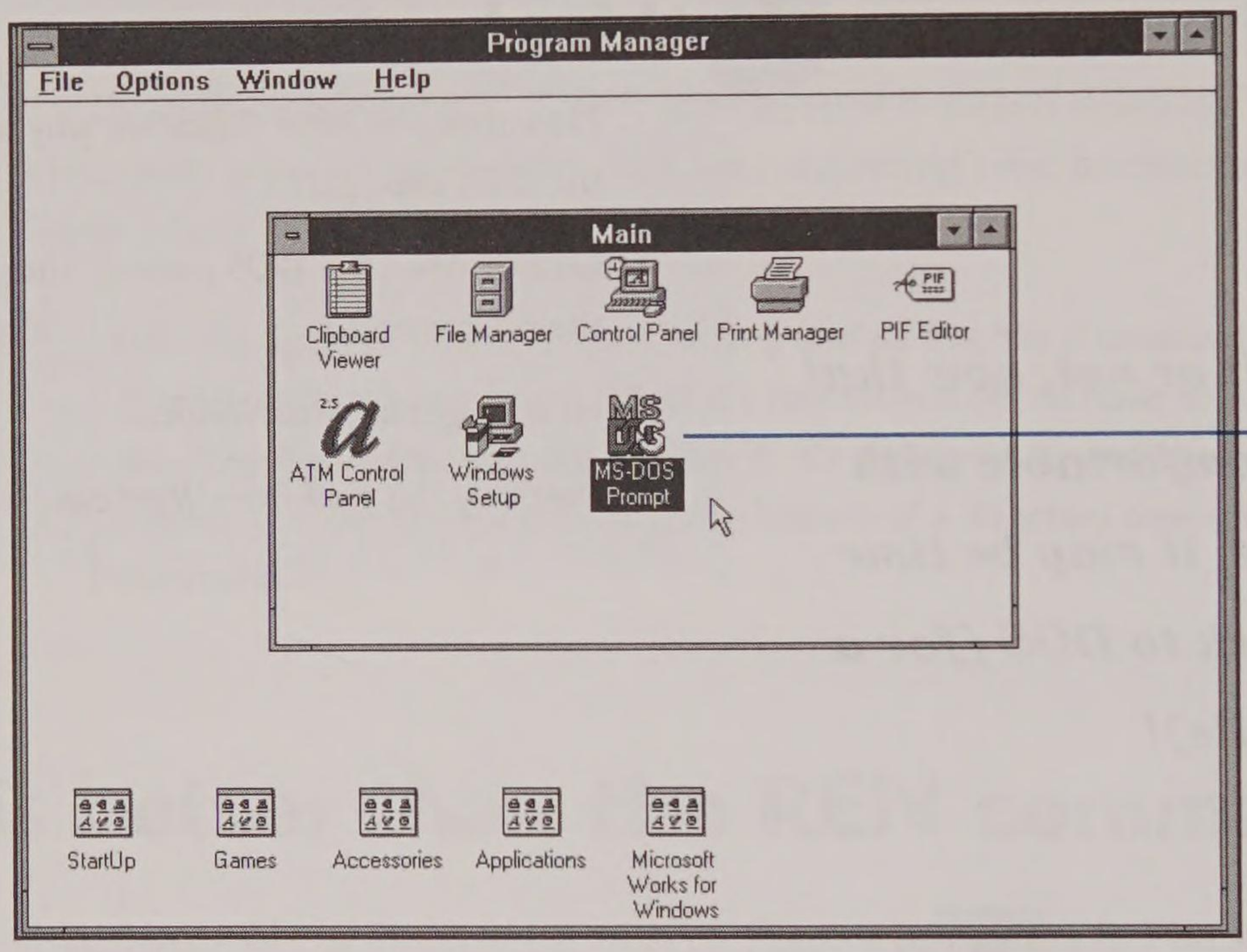


Fig. 22.1
There's usually an MS-DOS icon in the Main program group window.

To get to the MS-DOS prompt, double-click the MS-DOS icon. MS-DOS appears on your screen, like in figure 22.2. The prompt will probably appear in a **DOS window** within Windows. You can see Program Manager, or your wallpaper or desktop pattern, in the background behind the window.

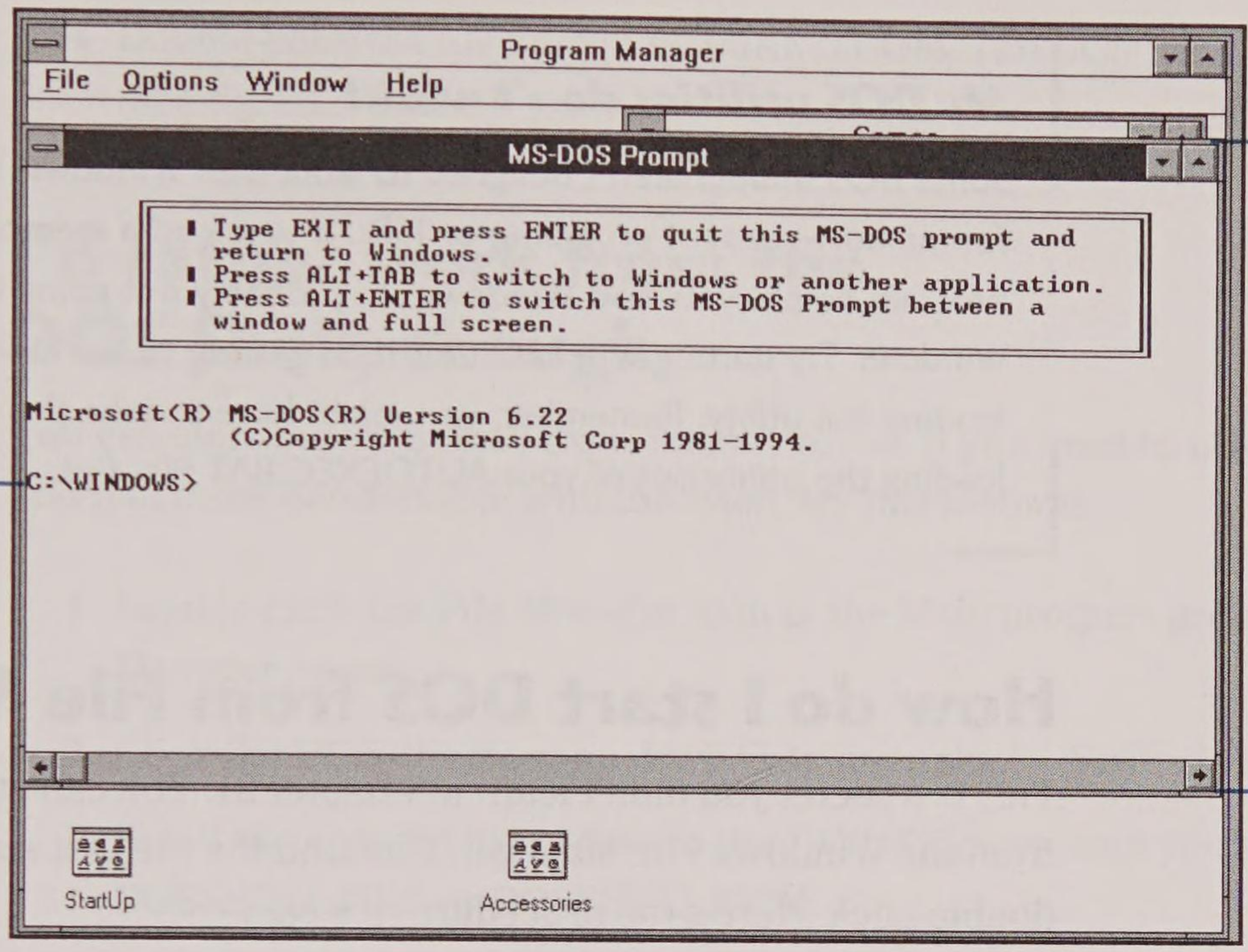


Fig. 22.2
The DOS prompt may appear full screen, or in a window, like it is here. Press Alt-Enter to switch back and forth between the two views.

(Tip)

You can't really do much in the way of sizing the DOS window. You can drag the borders a little bit, but for the most part, sizing is basically limited to maximizing to full size or minimizing to the size shown in the figure.

Q&A

I can't find the MS-DOS Prompt icon.

Your program groups may not be set up the same way mine are. Someone may have moved your icons, or renamed your groups. Open the other program groups to see if you can find the MS-DOS icon somewhere else. If you really can't find it, read on to find out how to start DOS from the Windows File Manager.

With DOS running, you can go ahead and use the DOS commands you need. Type the command at the prompt and press Enter, just as you would if Windows wasn't running.

Q&A

My DOS utilities don't work!

Some DOS utilities aren't designed to work with Windows. This is true especially for memory-resident programs, or TSRs. If you load a memory-resident DOS program before you load Windows, it's probably not going to work from within Windows. Try starting Windows first, then getting to the DOS prompt and loading the utility. Remember, you might have to take the command for loading the utility out of your AUTOEXEC.BAT file, first.

How do I start DOS from File Manager?

This is a secret you didn't learn in Chapter 21. You can start any application from the Windows File Manager. Just find the file that starts the program and double-click. Here's the procedure (it's easy):

1. Double-click the File Manager icon in the Main program group. File Manager opens.
2. Click the DOS directory on drive C: to open the DOS directory folder.
3. Scroll through the list of files in the DOS directory until you see the COMMAND.COM file, like in figure 22.3.

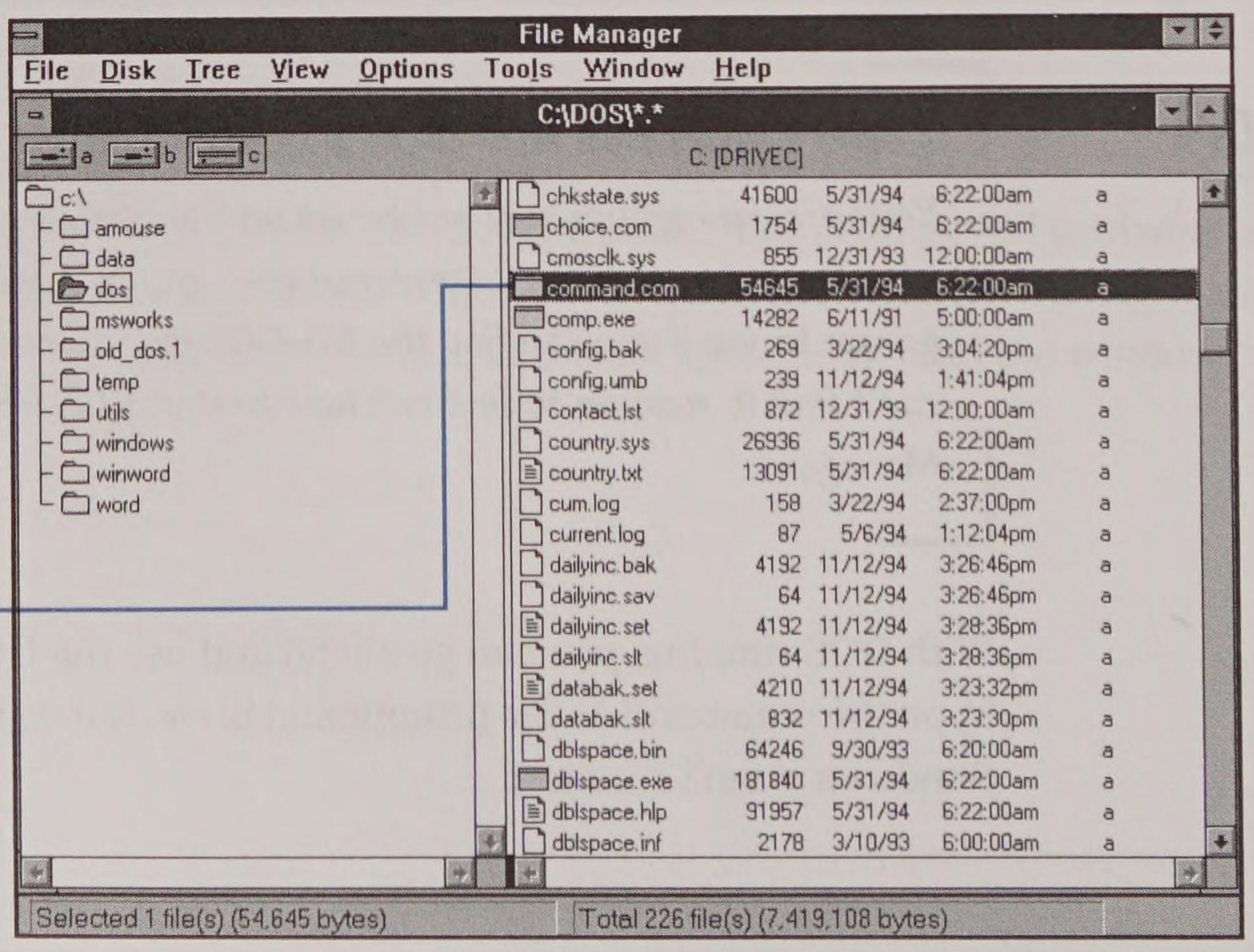


Fig. 22.3
This isn't as easy as double-clicking the MS-DOS Prompt icon, but it gives you the same result.

4 Double-click the file name COMMAND.COM. The DOS prompt appears (see fig. 22.2, again.)

I'd rather work from the DOS Shell, though

You can start the DOS Shell from Windows, too. If you need to use DOS but you feel more comfortable with the Shell, try this method:

1 Double-click the File Manager icon in the Main program group. File Manager opens.

2 Click the DOS directory on drive C: to open the DOS directory folder.

3 Scroll through the list of files in the DOS directory until you see DOSSHELL.EXE or DOSSHELL.COM.

4 Double-click the file name DOSSHELL.EXE or the file name DOSSHELL.COM. The DOS Shell starts.

How do I get back to Windows?

You can get back to Windows from DOS in two ways:

- Exit from DOS
- Leave DOS running but switch to Windows

Like any Windows task, you can leave DOS running while you use other Windows programs. If that's what you want to do, you can change programs using the methods you learned in Chapter 21, "Using the Windows File Manager."

- Press Alt-Tab to scroll through the open applications.
- Press Ctrl-Esc to use the Task List (see fig. 22.4).

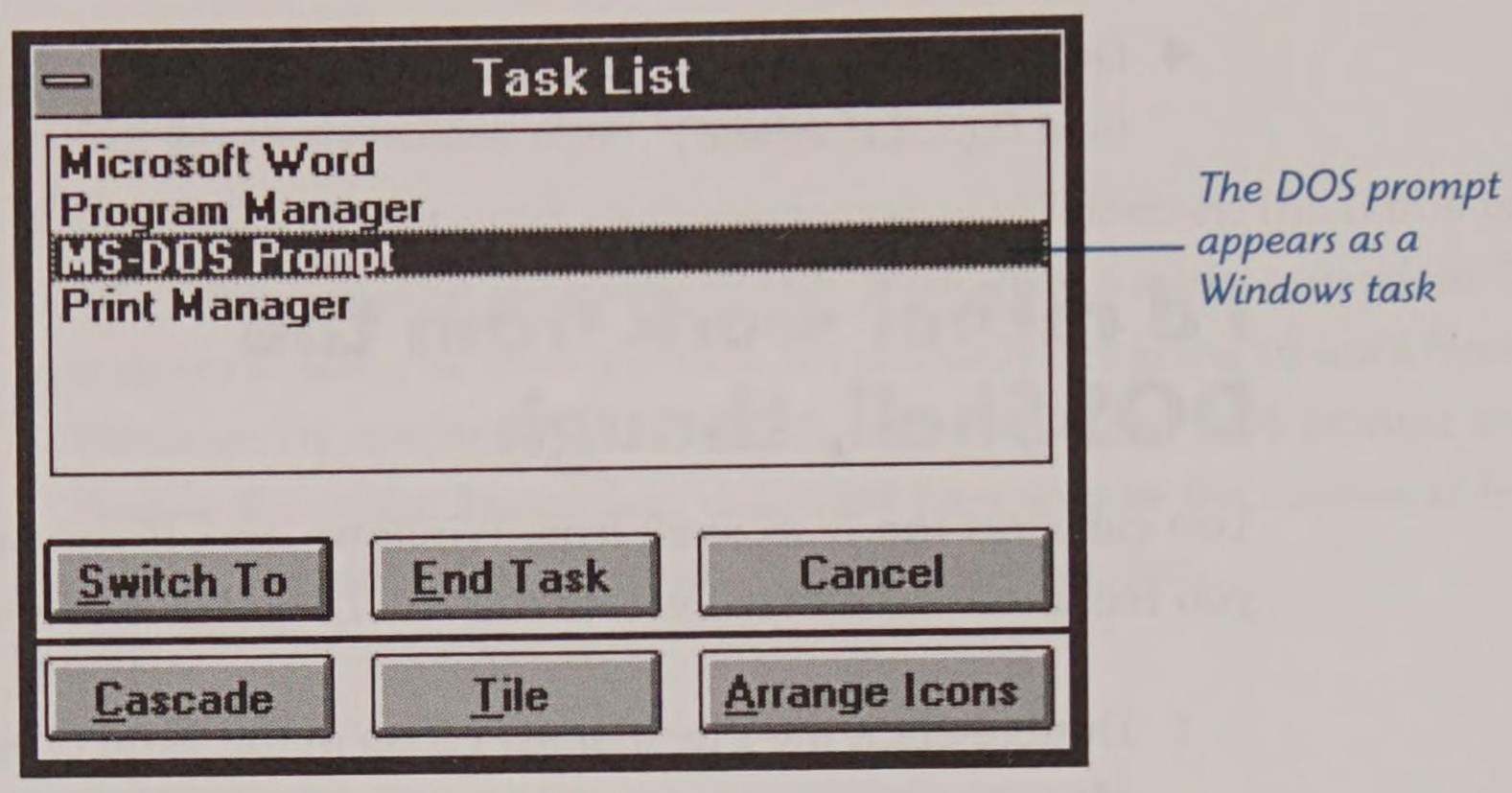


Fig. 22.4
If you leave the DOS prompt open while you work in Windows, it appears on the Task List along with your other Windows applications.

(Tip)

Unless you are going to be using DOS a lot, don't leave it open. Every open program uses memory, which makes other programs run more slowly.

When you are done using DOS, you must exit the DOS prompt and return to Windows before shutting off your computer. If you don't, you'll end up causing problems in open files and programs.

To close DOS and get back to Windows from the DOS prompt, type **exit** at the DOS prompt and press Enter.

From the DOS Shell, open the File menu and choose Exit.

Either way, you end up back at Windows.

Never try this from Windows!

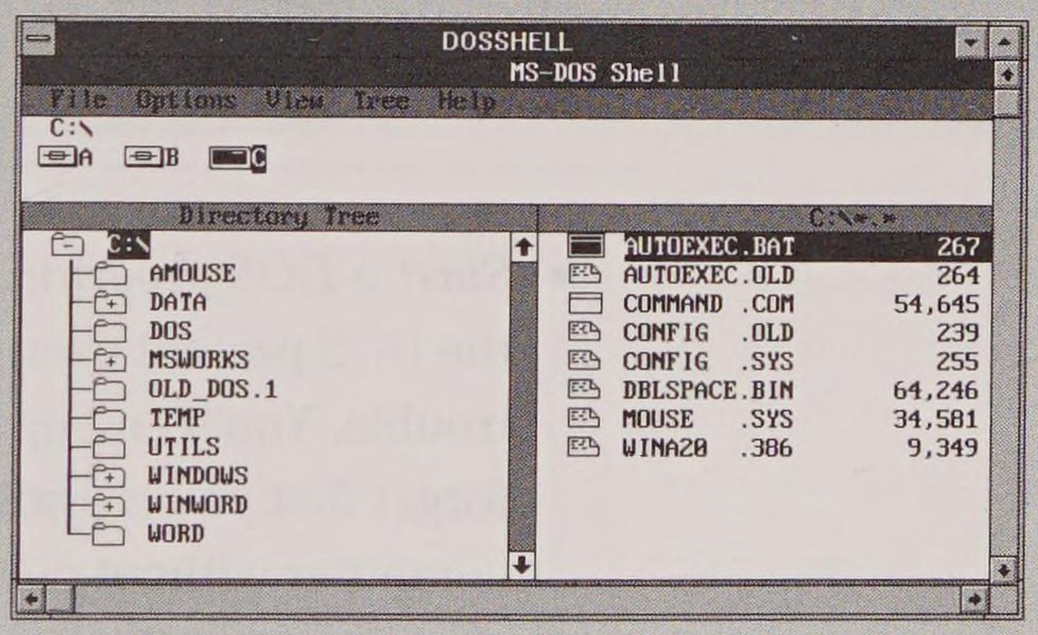
Of course, now that you've learned how easy it is to use DOS while Windows is running, you have to learn all of the things you should never ever do with DOS while Windows is running. Most of them will end up causing severe file damage.

- *Delete.* Don't delete files or remove directories with DOS while Windows is running. Some of the files might be in use by Windows or other open programs. If you delete them, you run the risk of losing data and damaging programs.
- *Undelete.* Don't undelete or recover files or directories with DOS while Windows is running. Utilities that undelete or recover files usually make changes to temporary files that Windows leaves open. Changing these files may cause Windows to freeze, or even shut down.
- *Repair disks.* Don't use any DOS utility to check or repair your hard disk while Windows is running. These utilities also make changes to files that Windows leaves open.
- *Start Windows.* When you're working along at the DOS prompt from Windows, it's very easy to forget that Windows is still running. The warning message that appears on the top of the DOS screen will scroll off the screen just like other DOS stuff (refer to fig. 22.2, yet again).

Windows-y things you can do with DOS

When you start DOS from Windows, you can manipulate it just like other DOS programs that you can run in Windows. (You can learn about using DOS programs in Windows in Que's *Using MS-DOS 6.2*, Special Edition or Que's *Using Windows, 3.11 Edition*, Special Edition.)

To put DOS in a window in Windows, double-click the MS-DOS Prompt icon in the Main program group; then press Alt-Enter. The DOS screen gets a title bar and command buttons. This works for either the DOS prompt or the DOS Shell, as you can see in the figure.



You can run the DOS Shell in a window that you can control like other Windows' windows.

Actually, DOS won't let you start Windows when Windows is already running. If you type **win** and press Enter, you see the message shown in figure 22.5, and you feel like an idiot.

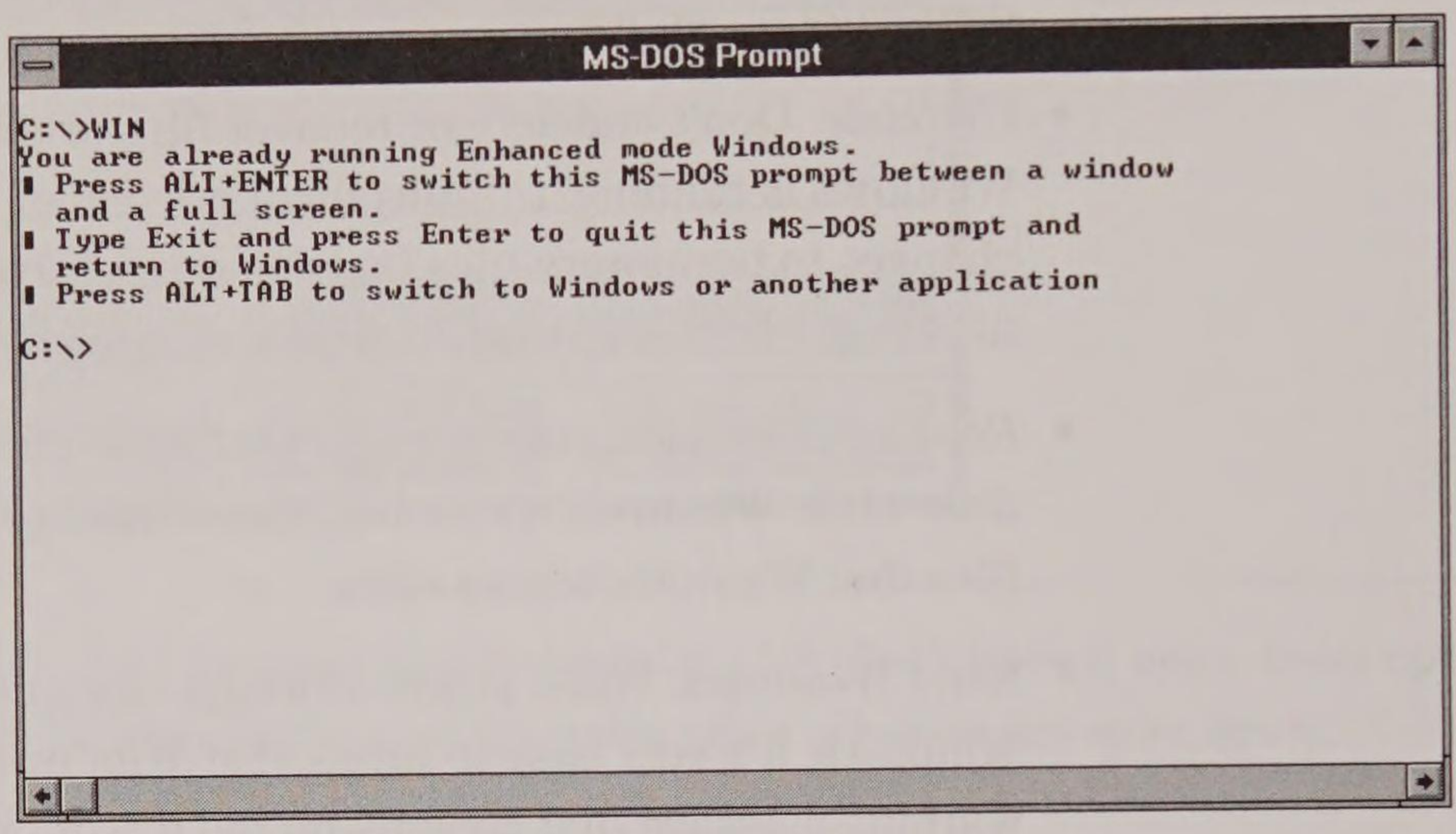


Fig. 22.5
If you forget Windows is already running, DOS reminds you when you try to start it again.

(Tip)

To give yourself a reminder that you're still running Windows even when you are using the DOS prompt, add this command to your AUTOEXEC.BAT file:

```
set winpmt=Win $p$g
```

Your DOS prompt will say Win in it, which should give you a clue where you really are.

- *Start a DOS program.* Technically, you can start DOS programs from the DOS prompt even while Windows is running, but that's asking for trouble. You'll end up using all of your memory, and you can easily forget that you are still inside the Windows interface, and shut off the computer without correctly closing all open programs. Just start the program from Windows, or close Windows and use the program from DOS.
- *Format.* Don't try to format a disk with DOS while Windows is running. Using the FORMAT command may affect the temporary Windows files, and it may affect a disk you are currently using for another open program. If you need to format a disk, use File Manager.

- *Power down.* Never shut off your computer from the DOS prompt while Windows is running. It's easy to forget that both DOS and Windows are running when you are looking at the DOS prompt. Shutting off the computer can damage your Windows files, as well as the files of other programs open in Windows.

DOS commands you should never use while Windows is running

There are some DOS commands you should never use while Windows is running. Most of them fall into the categories just mentioned; but just to be sure, before you use a DOS command, check the following list to make sure it's OK:

- APPEND
- CHKDSK (with the /F parameter)
- DEFRAG
- EMM386
- FASTOPEN
- MEMMAKER
- MSCDEX
- NLSFUNC
- SCANDISK (for repairing disks)
- SMARTDRV
- SUBST
- VSAFE

23 Make the Most of Your Memory with MemMaker

If I want to work with big files and run big programs, I need to load this baby with as much memory as it can hold, right? Well...not quite.

In this chapter:

- What is memory, anyway?
- Do I have enough memory?
- Memory management—sounds hard, but isn't
- What MemMaker does to your computer
- How to use MemMaker

Just as important as having enough memory, is having your memory organized *just so*. Pretend memory is the top of your desk. No matter how big your desk is, if you've got your PC on it, your printer on it, your phone on it, your answering machine on it, and your fax on it, you don't have any room to spread out your papers. Memory is like that—if you fill it up with lots of programs, DOS, and data files, you don't have any room to get any work done!

How does DOS use memory?

When you work with printed stuff, you can't see the contents of a file until you open it and spread it out on your desk. DOS uses your computer memory like a desk—when you open a file, DOS spreads it out in memory so you can use it. If you have a big desk, you can take all the pages out of the file so you

don't have to shuffle paper very often. If you have a lot of available memory, you can work with the whole file, without waiting for DOS to shuffle data back and forth to the disk, taking stuff out and putting it back to get out something else.

On every single PC in existence, DOS only uses the first 640K bytes of memory to actually process information. This 640K is called **conventional memory**. All the programs you are using, the data files you are using, and even DOS itself have to fit inside conventional memory.

So why do computers come with more than 640K bytes of memory? Because, with a little help from DOS, you can set things up so DOS can temporarily *store* stuff you don't need right now in the extra memory, leaving more room in conventional memory to get work done.

If memory isn't conventional, what is it?

If you have more than 640K bytes of memory on your computer—and you probably do—DOS organizes it into two additional categories:

- **Upper memory** is all the memory between conventional memory (the first 640K) and 1 megabyte (usually abbreviated MB).
- **Extended memory**, or **high memory**, is all memory over 1 MB.

DOS can also use **expanded memory**, although it's not very common anymore. Expanded memory is a combination of hardware and software that tricks older computers into thinking they have more conventional memory than they really do.

{Note}

Remember, a byte is equal to one character. A kilobyte equals about a thousand characters, and a megabyte equals about a million. If your computer has 4 megabytes of RAM, then it can hold about 4 million characters in its memory at any one time.

How much memory do I have on my computer?

DOS usually tells you how much memory is installed in your computer when you first start up. Watch your screen. One of the messages that flashes by before the DOS prompt appears actually counts the memory. It says something like the following:

```
4 megabytes of memory installed
```

If you have DOS 5.0 or later, you can find out more about your memory, including whether it's conventional, upper, or high. At the DOS prompt, type **mem** and press the Enter key. DOS displays a report on-screen that describes your memory in detail. Look at figure 23.1 for more details.

How much memory is installed — *How much memory is used* — *How much memory is available*

```
C:\>mem

Memory Type        Total   =   Used   +   Free
----------------  -------      -------    -------
Conventional         640K        215K       425K
Upper                  0K          0K         0K
Reserved             384K        384K         0K
Extended (XMS)     3,072K      1,396K     1,676K
----------------  -------      -------    -------
Total memory       4,096K      1,995K     2,101K

Total under 1 MB     640K        215K       425K

Largest executable program size          425K (435,056 bytes)
Largest free upper memory block            0K       (0 bytes)
The high memory area is available.

C:\>
```

Fig. 23.1
The MEM command gives a complete report on memory in your system, including a breakdown of the different types of memory, how much is available, and how much is used.

Q&A

Why does DOS say *Bad command or file name?*

Chances are you have a version of DOS released prior to 5.0. That means, you can't use the MEM command. You may be able to buy a software program that will do the same thing as MEM. Ask your local software dealer.

How much memory do I need?

The type of work that you do and the kinds of software that you do it with determine your memory needs. If you only work with DOS and a few software applications that were written for it, then you might be quite happy with 640K. Lotus 1-2-3 version 2.3, Harvard Graphics version 3, WordPerfect 5.1, and Microsoft Word 5.0 are all examples of software programs that work well within conventional memory.

(Tip)

If your computer runs Windows 3.1 or higher, or if you are thinking about getting Windows, buy as much memory as you can reasonably afford without going into bankruptcy. The memory requirements for Windows say, "You need two megabytes of memory to run this software." Sure, it'll run, but so does a Yugo. Windows runs best with 4 MB or more of RAM.

You don't need an MBA to manage your memory

Managing your computer's memory is like using mnemonics or rhymes to remember stuff. You might be able to recall that November has 30 days, but you probably recall it faster humming "Thirty days has September, April, June, and…".

Likewise, your computer can access files that are stored on a disk, but it can access them faster if it can keep them stored in memory.

Remember, no matter how much memory you have on your PC, everything is processed in conventional memory. But, if you manage your memory correctly, you can use upper and extended memory for temporarily storing stuff like device drivers, memory-resident programs, and DOS. This makes more room in conventional memory for programs to run faster, jump higher, and perform to the max in all ways.

Here are some reasons you should manage your memory:

- Things will move faster on-screen.
- You can use bigger programs.
- You paid for it, you may as well use it.

Techno-wizards can spend days configuring their system memory just so. The rest of us, however, would rather watch an empty screen than mess around with stuff like NOEMS, UMBs, and the difference between extended memory and expanded memory.

That's why there's MemMaker. MemMaker is a **memory optimization program**, which means it automatically sets up your computer so that it can use all the memory you have installed. Usually, that means you can run bigger programs, and that some programs will run faster because you don't have to wait while DOS swaps files back and forth from disks.

{Note} MemMaker was first included with DOS 6.0, so if you are using an earlier version of DOS, you don't have MemMaker.

NOEMS, UMBs, and what?

Really, you don't need to know. MemMaker will take care of it. But, since you asked...

UMB stands for **upper memory block**, which is an area of upper memory that DOS can use.

NOEMS is a switch used with the **EMM386.EXE** memory management device driver. EMM386 gives you access to upper memory and, if you want, lets you use extended memory like expanded memory. If you add the NOEMS switch to the EMM386.EXE command statement in CONFIG.SYS, DOS can use the upper memory area but can't convert extended memory into expanded memory.

Another memory thing you might want to know about is **RAMDRIVE**, which is a device driver that lets you use a portion of your memory as a pretend disk drive, called a **RAM disk**. RAM disks are really fast.

There. Now aren't you glad you have MemMaker?

So what does MemMaker do?

Basically, MemMaker analyzes the amount of memory you have on your PC and the types of programs you use. Then it decides how to organize the programs you use most often to make the best use of the memory you have.

MemMaker actually changes your startup files—CONFIG.SYS and AUTOEXEC.BAT (remember them? If not, go back to Chapter 10, "What Happens When You Start Your Computer?")—so that some programs and device drivers are automatically loaded into high memory every time you start your computer. This leaves more conventional memory free for running programs. MemMaker takes the guesswork out of memory management; so even if you have no clue what any of this means, you can still manage your memory.

MemMaker also makes copies of your old AUTOEXEC.BAT and CONFIG.SYS files and stores them in your DOS directory under the new names AUTOEXEC.UMB and CONFIG.UMB. If you decide you were better off pre-MemMaker, you can restore the old startup files.

(Tip)

If you only use Windows and Windows programs, you'll only get a little benefit from running MemMaker. If you use DOS-based programs, or both DOS and Windows programs, MemMaker is the easiest way to manage your system memory.

Go ahead and compare figure 23.2 and figure 23.3 to see the difference between a pre-MemMaker CONFIG.SYS file and a post-MemMaker CONFIG.SYS file. Then, you can compare figure 23.4 to figure 23.5 to see the difference between a pre-MemMaker AUTOEXEC.BAT file and a post-MemMaker AUTOEXEC.BAT file.

Fig. 23.2
Before running MemMaker, you don't see any DEVICEHIGH statements in the CONFIG.SYS file, but...

```
C:\>type config.sys
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\EMM386.EXE NOEMS
DEVICE=C:\DOS\SMARTDRV.EXE/DOUBLE_BUFFER
BUFFERS=20,0
FILES=50
STACKS=9,256
LASTDRIVE=E
FCBS=16,0
DEVICE=C:\DOS\SETVER.EXE
DEVICE=C:\MOUSE.SYS
SHELL=C:\DOS\COMMAND.COM C:\DOS\  /p

C:\>
```

Fig. 23.3
...after running MemMaker, you do.

```
C:\>type config.sys
DEVICE=C:\DOS\SMARTDRV.EXE/DOUBLE_BUFFER
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\EMM386.EXE NOEMS
BUFFERS=20,0
FILES=50
DOS=UMB
LASTDRIVE=E
FCBS=16,0
STACKS=9,256
DEVICEHIGH /L:1,12048 =C:\DOS\SETVER.EXE
DEVICEHIGH /L:1,34592 =C:\MOUSE.SYS
SHELL=C:\DOS\COMMAND.COM C:\DOS\  /p

C:\>
```

Fig. 23.4
Before running MemMaker, you don't see any LH commands in the AUTOEXEC.BAT file, but...

```
C:\>type autoexec.bat
C:\DOS\SMARTDRV.EXE
C:\DOS\SHARE.EXE
@ECHO OFF
PROMPT $p$g
PATH C:\DOS;C:\WINDOWS;C:\UTILS;C:\WORD
SET TEMP=C:\DOS
SET WIN$=C:\WINDOWS
C:\AMOUSE\AMOUSE
C:\UTILS\SAVE /CG /A
CLS

C:\>
```

Fig. 23.5
...after running MemMaker, you do.

```
C:\>type autoexec.bat
LH /L:0;1,45456 /S C:\DOS\SMARTDRV.EXE
LH /L:1,13984 C:\DOS\SHARE.EXE
@ECHO OFF
PROMPT $p$g
PATH C:\DOS;C:\WINDOWS;C:\UTILS;C:\WORD
SET TEMP=C:\DOS
SET WIN$=C:\WINDOWS
LH /L:1,17408 C:\AMOUSE\AMOUSE
LH /L:1,84416 C:\UTILS\SAVE /CG /A
CLS

C:\>
```

Just in case—back up your startup files first

Using MemMaker probably won't screw up DOS or your PC, but you never know. Just in case, here are a few things you should do before you start MemMaker:

- Copy your CONFIG.SYS file to a floppy disk (see Chapter 11, "How to Edit Startup Files with the MS-DOS Editor (and Without It)").
- Copy your AUTOEXEC.BAT file to a floppy disk (again, see Chapter 11).

- Make an emergency boot disk (see Chapter 6, "DOS Stuff You Can Do with Disks").

Once you have covered your backside by copying your startup files, you can do a few things to help MemMaker do its job right. MemMaker bases its memory management decisions on the stuff it finds in your CONFIG.SYS and AUTOEXEC.BAT files. That's where it learns what hardware you use, what kind of memory you have, and what memory-resident software programs you usually run. So, it's a good idea to make sure your CONFIG.SYS and AUTOEXEC.BAT files are up-to-date.

Here's what you should do to make sure your startup files are up-to-date before starting MemMaker:

- Check your CONFIG.SYS file and delete any unnecessary commands (see Chapters 10 and 11).
- Check your AUTOEXEC.BAT file and delete any unnecessary commands (see Chapters 10 and 11).
- Add commands to your AUTOEXEC.BAT file to start all memory-resident programs and TSRs you use a lot. For example, if you always run a delete protection program, make sure it is included in your AUTOEXEC.BAT file (see Chapters 10 and 11).
- If you change CONFIG.SYS or AUTOEXEC.BAT, reboot your computer so the changes take effect (see Chapter 2).

Finally, before you start MemMaker, close every other program—including Windows.

Okay, let 'er rip

Once you get through all the stuff you have to do first, starting MemMaker is simple:

1. At the DOS prompt type **cd** and press Enter to make sure you are in the root directory.
2. Type **memmaker** and press Enter. MemMaker gets going and the Welcome screen appears, as shown in figure 23.6.

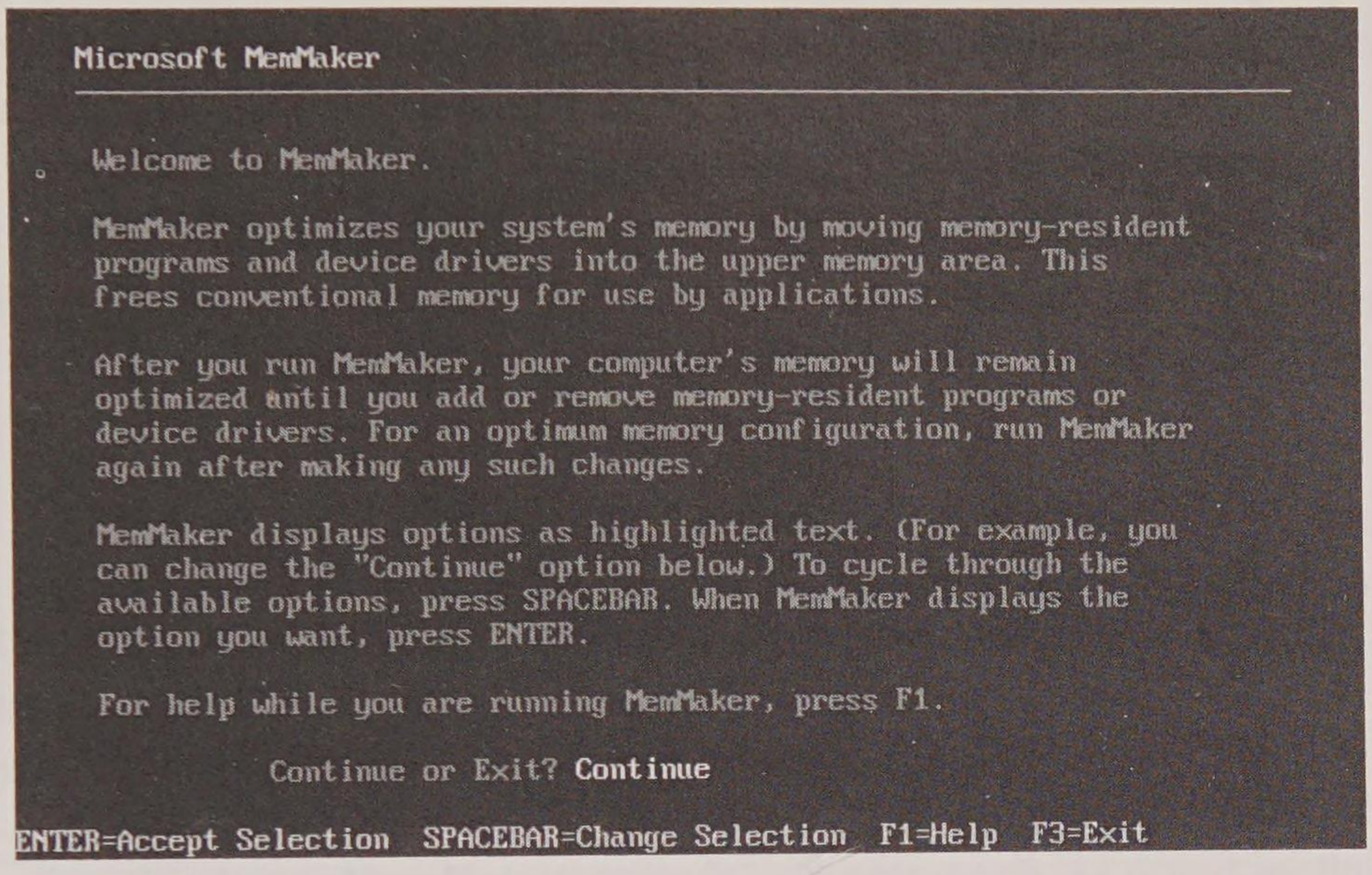


Fig. 23.6
MemMaker starts with this Welcome screen that tells you how to get through the program.

Don't be surprised by the way MemMaker looks—it isn't DOS. It tells you everything you need to know right on the screen; and it lets you make choices using menus, instead of by typing commands. The current menu choice shows up on-screen highlighted, or in a different color than everything else. The following table lists the ways to make choices in MemMaker:

Press this key	To do this
Space bar	Show an alternate choice
Enter	Select the current choice
F1	Get help
F3	Exit MemMaker

From the Welcome screen, you can either continue with MemMaker or give up and go back to DOS. Here's what to do:

- Continue is the choice highlighted on your screen, so to continue, just press Enter.
- If you chicken out, press the spacebar so that Exit is the choice highlighted on your screen, then press Enter. MemMaker asks if you are sure you want to quit, then goes back to the DOS prompt.

{Note} Sorry, you can't use a mouse in MemMaker.

Getting through MemMaker is mostly a matter of sitting back and letting the program do its stuff, but you will have to answer a couple of questions. Don't worry. When in doubt, just press Enter to continue.

Which setup should I use?

By now you have started MemMaker and pressed Enter from the Welcome screen to continue. Your screen looks like figure 23.7, and you are wondering "What's the difference between Express Setup and Custom Setup?" Here's the answer:

- Express Setup is the quickest, easiest way to manage your memory.
- Custom Setup requires you to know something about the way your programs use memory and how you want to organize them.

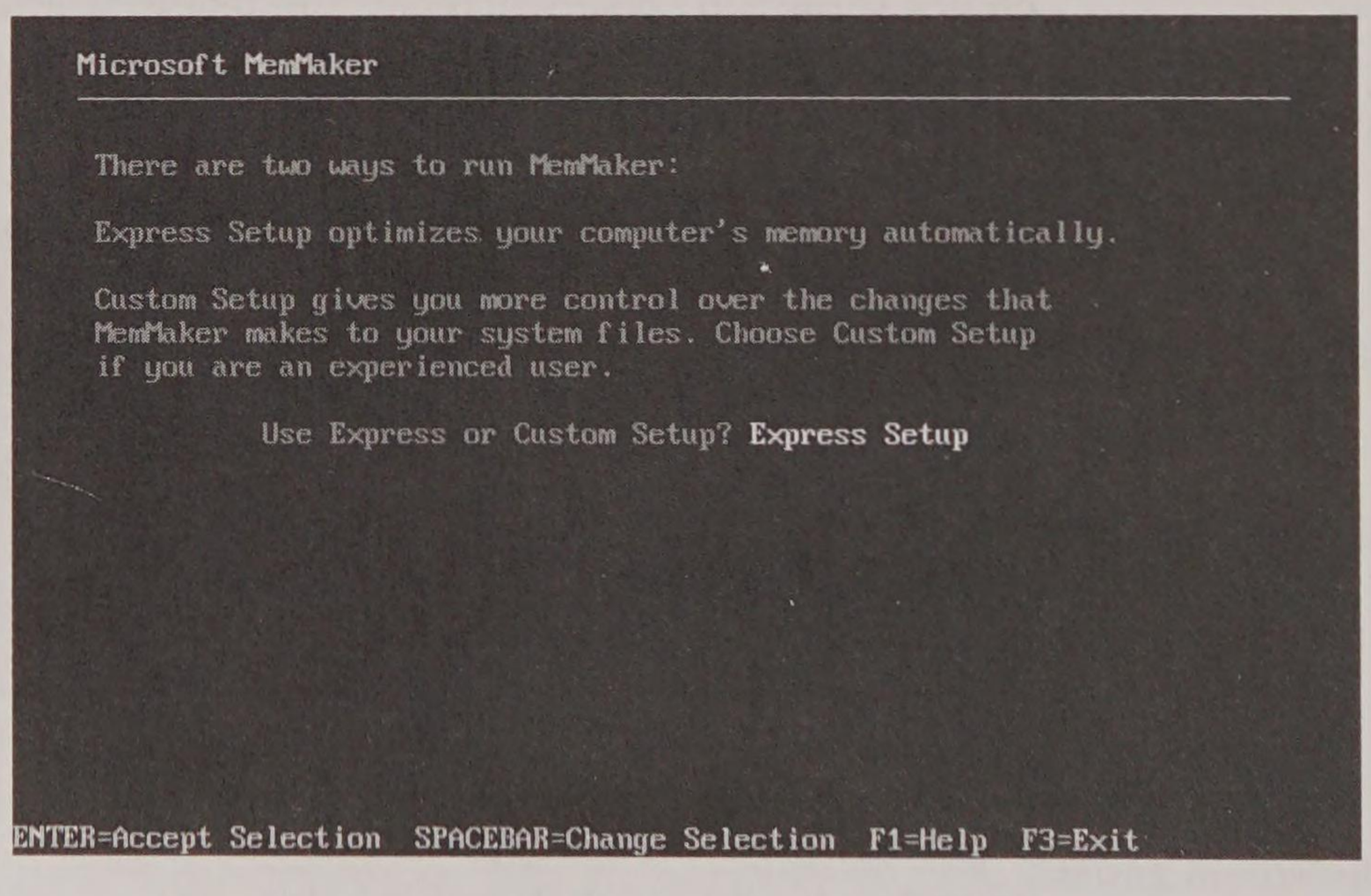


Fig. 23.7
From this screen, you can choose Express Setup to let MemMaker organize your memory for you, or you can choose Custom Setup if you want a hand in it.

Now you are wondering, "Which one should I use?" Here's the answer:

- Express Setup. *Unless* you feel really confident about configuring device drivers and things like that…

Of course, there are exceptions. Here are some reasons why you might want to choose Custom Setup:

- You don't want to load all device drivers into upper memory. This is useful if you try to run MemMaker but a device driver is giving you problems. You can use Custom Setup to choose which device drivers to load high and which to leave alone.
- You have an EGA or VGA monitor. You can use Custom Setup to choose to use the area of memory reserved for running monochrome monitors for running programs. (This doesn't work if you have a Super VGA monitor or an AVGA monitor.)
- You use DOS-based applications with Windows. Usually, if you use Windows, MemMaker doesn't help you much, as noted earlier. But if you use DOS-based applications with Windows, you can use Custom Setup to reserve some upper memory space for when you run Windows.

Q&A

I accidentally chose Custom Setup and now I want out!

Don't worry, you can quit MemMaker and start all over without making any changes to your memory management. Press F3 to Exit, then press Yes to confirm that you really want to exit.

Do I need expanded WHAT?

Once you choose Express Setup, you might think you are home free. But no, another screen appears asking yet another seemingly esoteric question: `Do you use any programs that need expanded memory?` Actually, this screen appears even if you choose Custom Setup.

As explained earlier in this chapter, expanded memory is a combination of hardware and software that tricks a PC into thinking it has more conventional memory available than it really does. Some programs, like older versions of Lotus 1-2-3, can only use expanded memory.

(Tip)

There is only one sure way to find out if your programs use expanded memory—read the documentation that came with them.

Luckily, with MemMaker it is not an either/or proposal—you can choose one answer now, and change your mind later. Use the following checklist to decide what to do next:

- If you know for sure that you don't have programs that use expanded memory, press Enter.
- If you don't know for sure whether you have programs that use expanded memory, press Enter. You can run MemMaker again later, if you have to.
- If you know for sure that you have programs that use expanded memory, press the spacebar to change the menu choice to Yes and then press Enter.

Now, if you are using Express Setup, MemMaker can finally get to work. (If you are using Custom Setup, you have to answer more questions, like which device drivers you want to install and whether you want to leave upper memory space free for Windows.)

Q&A

What do I do if it starts asking me about Windows?

MemMaker just wants to know because it will factor that into its memory optimization theories. Here are some things you should know about MemMaker and Windows:

- If you use only Windows and Windows-based programs, MemMaker helps some, but not that much. That's because MemMaker frees conventional memory at the expense of extended memory, but Windows and Windows programs use extended memory.
- If you use Windows with some DOS-based programs, MemMaker can help.

If you use MemMaker's Express Setup, MemMaker will check to see if you have Windows installed, and it may ask you to confirm the directory where Windows is located. If you use Custom Setup, MemMaker gives you the option of "optimizing upper memory for use with Windows?" For best results, choose Yes if you use DOS-based programs, but choose No if you use only Windows programs.

MemMaker restarts your computer by itself, then restarts your computer by itself

Welcome to the department of redundancy department. You will now sit by while MemMaker restarts your computer, then restarts it again. But, there is a method to this madness. The first time, MemMaker analyzes your system. The second time, MemMaker tests the new configuration.

This is what happens:

1 Once you choose whether or not you need expanded memory, MemMaker checks to see if you have Windows, then displays the screen shown in figure 23.8.

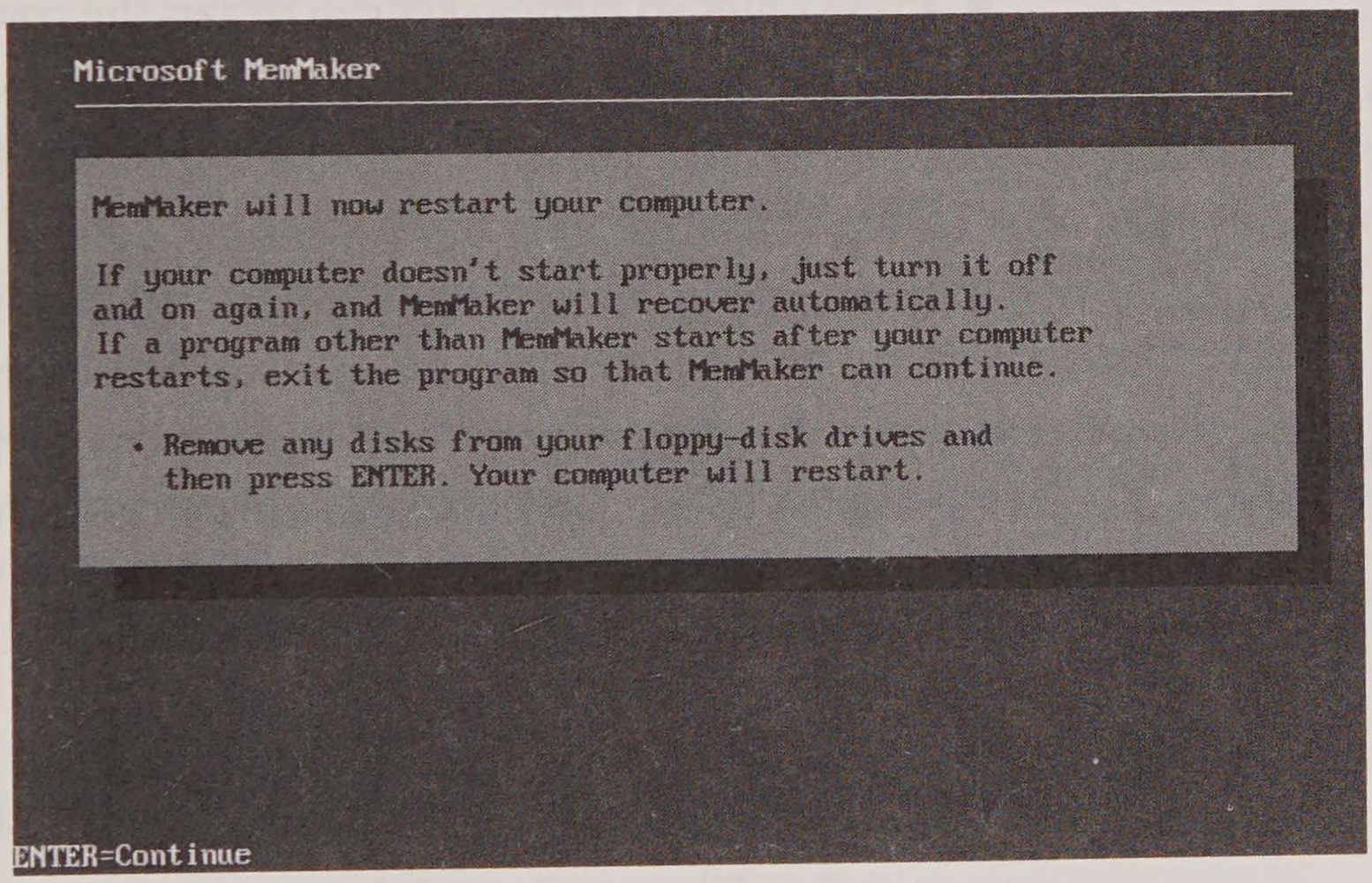


Fig. 23.8
MemMaker shows this screen to tell you it is ready to restart your computer for the first time.

2 Make sure there are no disks in your floppy drives, then press Enter. MemMaker restarts your computer, reading your CONFIG.SYS and AUTOEXEC.BAT files to decide how to make use of your available memory.

3 MemMaker changes your CONFIG.SYS and AUTOEXEC.BAT files, then displays the screen shown in figure 23.9.

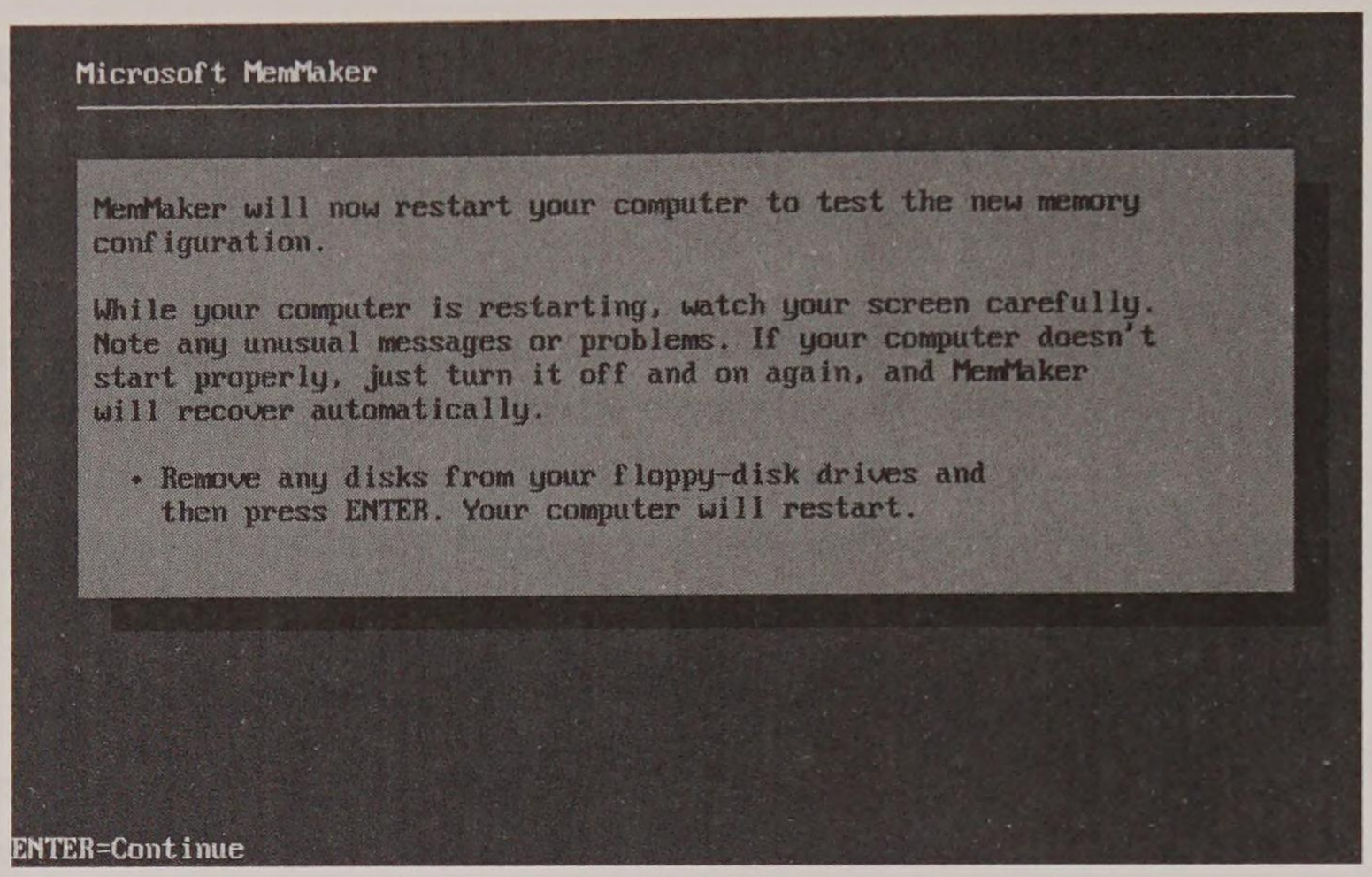


Fig. 23.9
MemMaker shows this screen to tell you it is ready to restart your computer for the second time (and no, it is not exactly the same as the previous screen).

4 Press Enter so MemMaker can restart the computer again to test the changes it made. Watch the screen to make sure your system starts correctly and write down any unusual messages. (I got one once that said, `EMM386 exception error #12 Press Enter to reboot`.)

5 If everything works OK, press Enter again. MemMaker finishes up and displays a status report on your screen (see the next section).

(Tip)

If everything doesn't work OK, press Ctrl-Alt-Del to reboot your computer and try again.

Read the report and be proud

MemMaker wants you to know what a great job it did, and how much more efficient your use of memory will be from now on. So, when it's done, it prints up a nice little Before and After report and displays it on your screen (see fig. 23.10).

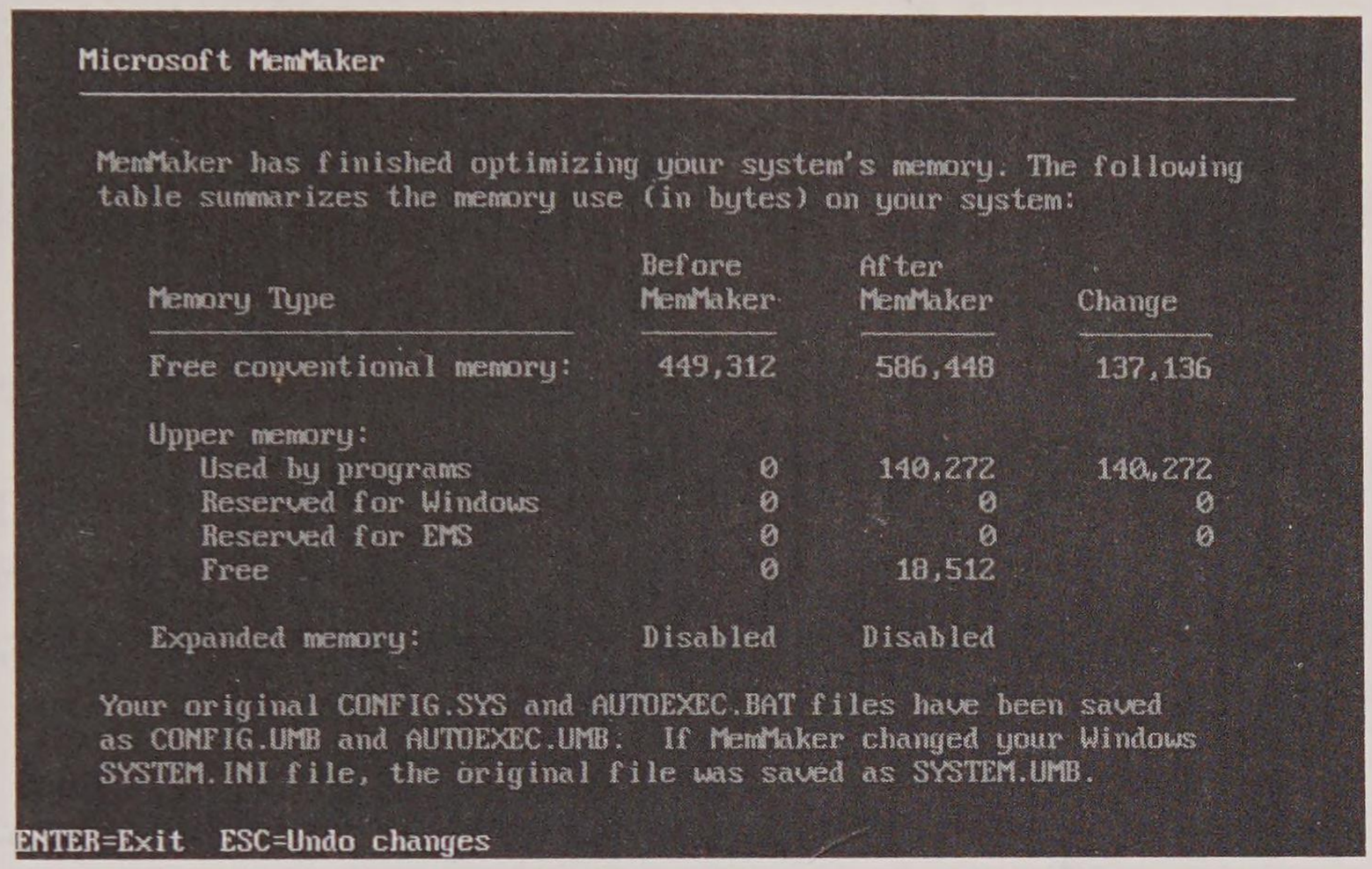


Fig. 23.10
You can use the MemMaker status report to see how MemMaker has affected the way your computer uses memory.

You can compare the numbers in the Before MemMaker column to the numbers in the After MemMaker column to decide whether it was worth it or not. If you decide it was worth it, press Enter to exit MemMaker and return to the DOS prompt. If you decide it wasn't worth it, press Esc to undo the changes and return to the DOS prompt.

(Tip)

Print the final MemMaker screen so you can have a copy of the way your system memory is allotted. It may be useful if you are considering adding new software or devices.

MemMaker killed my PC!

It is possible that your PC won't start right after you run MemMaker. Don't panic, that's why you made copies of your CONFIG.SYS file and AUTOEXEC.BAT file before you started. And if you didn't, you still don't have to panic—MemMaker did.

If MemMaker encounters a problem while it is still running (remember that EMM386 exception error I mentioned earlier?), it tells you just to reboot your computer, or to exit MemMaker without making any changes. Go ahead and do either one. Then decide whether you want to try running MemMaker again.

If you run into a problem after you have already exited MemMaker, you have two options:

- You can copy your AUTOEXEC.BAT and CONFIG.SYS backups back into your root directory.
- You can type **memmaker /undo** at the DOS prompt.

If your PC is really dead, and you can't even get DOS to load, use your emergency boot disk to reboot. Once you get to the DOS prompt, you can restore your AUTOEXEC.BAT and CONFIG.SYS files or, in the case of a total disaster, setup DOS again on your hard disk.

{Note}

You should run MemMaker again any time you install a new device or change the commands in your AUTOEXEC.BAT file. That way, you know you are getting the best from your system memory.

24 Cram More Data onto Your Disk with DoubleSpace and DriveSpace

Can't squeeze another byte onto that hard disk? Maybe disk compression is your solution!

In this chapter:

- Disk compression can really expand your disk space
- What's the difference between DoubleSpace and DriveSpace?
- How to compress your disk
- You can even compress floppy disks
- How do I remove disk compression?

Beginning with MS-DOS version 6.0, Microsoft began including a new utility with its operating system—DoubleSpace, which is a program that makes your hard disk appear to be almost twice as big as it was when you bought it. Neat trick! Unfortunately, disk compression software has its share of detractors who warn that anyone who uses it will lose everything on the drive.

This is where all that mess gets cleaned up. We'll tell you what DoubleSpace is, what it does, and what, if anything, you have to worry about. At this point, I must admit that of the three machines I own, one is a laptop that uses DoubleSpace on the hard disk. After more than a year, everything I ever put into the machine is still there.

Why should I compress my disk?

Some people say that programmers are getting lazy. Others say that the demands of computer users are causing programs to get bigger and more complicated.

Who's right? It doesn't really matter. The fact is that every program you buy takes up more space on your disk than ever before. And **disk-doubling software** like Stacker, SuperStor, and DoubleSpace (now called DriveSpace) can significantly improve your computer's ability to cram in more data.

> ***Plain English, please!***
>
> Disk compression doesn't really compress disks—it compresses the files on the disks so they take up less space. The compression process is done in the background (thankfully!) by special software programs that are often called **disk-doublers**.

How disk compression works

As you may have guessed by now, disk compression is a way of getting more information onto a hard disk than was ever intended by the guy who screwed the disk together in the first place.

Essentially, any file that is ever saved to disk by a computer contains many wasteful and duplicated characters. Suppose you use a graphic program to save a picture that you've drawn. It may have lines and lines of white space with only a few black dots where the drawing appears. A disk compression program looks at this as a pattern and saves it as a formula that says, "600 times a white dot," rather than 600 different white dots.

In the case of DoubleSpace, your hard disk gets one really large *hidden* file placed upon it. A special program called DBLSPACE.BIN is loaded in your computer's memory when the computer is turned on. (You'll never even know it's working, which is nice.) This program watches what you save and what you retrieve from your drive. You think you're saving stuff to drive C:, but DBLSPACE.BIN is really intercepting everything, scrunching it up and stuffing it into the hidden file.

Then, just to complete this binary hocus-pocus, the part of your hard disk that isn't included within the hidden file is given another drive letter. By default, the letter will be H: (yep, you get a drive C: *and* a drive H:); but when you perform the installation of this program, you get to choose the letter. You can save things on this drive too, but the files aren't compressed. Figure 24.1 shows how a hard disk looks before and after disk compression is used.

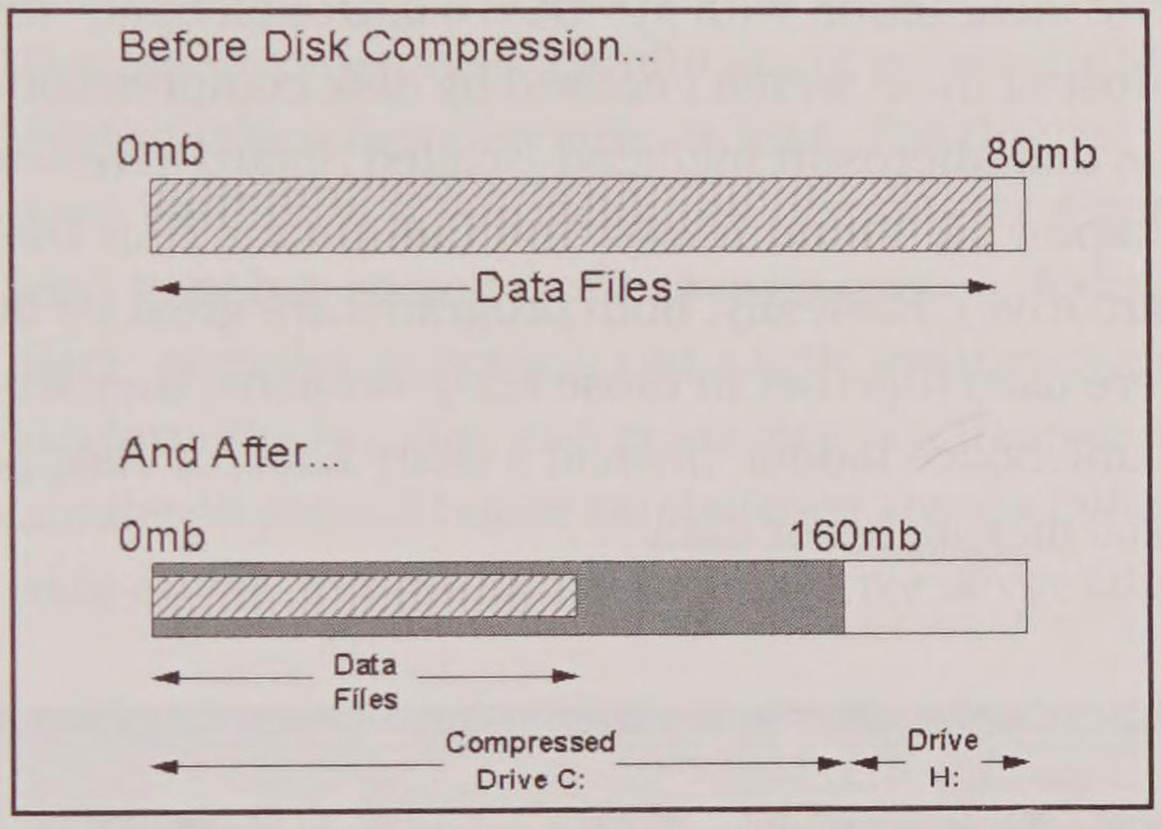


Fig. 24.1
In the first part of this figure, an 80 MB hard disk is crammed full of data files. After disk compression is installed, the same files take up much less space and there's still room for almost 80 MB more. Drive H: is the uncompressed portion of the disk and is only about 5 MB.

Which do I have—DoubleSpace or DriveSpace?

The disk-doubling program that comes with MS-DOS has two different versions, depending on which version of DOS you own. In DOS 6.0 and 6.2, the program was called DoubleSpace. In 6.21, it didn't exist at all (see the following note); and in 6.22, it was called DriveSpace. From the point of view of the end-user (you), they're all identical, although the latest is definitely the best from a dependability point of view.

{Note}

Another company that had long offered disk compression utilities decided that Microsoft's DoubleSpace had come a little too close to their own program. They sued Microsoft and won. So DOS 6.21 was released without any kind of disk compression utility, and DOS 6.22 came out with something new called DriveSpace.

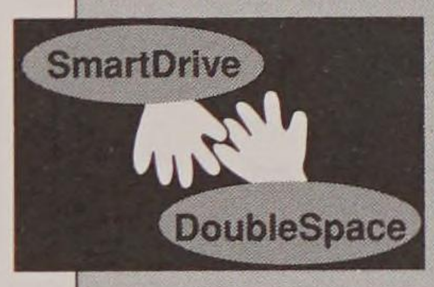
Inside, at the program level, they're different enough to avoid legal hassles. Outside, from our view, there's no difference at all. In order to avoid confusion, we'll use the term DoubleSpace to describe Microsoft's disk compression program, since that is the name that most people use right now.

Problems with DoubleSpace

Because of the fact that a hidden file turns into a drive, and the drive you had before turns into *another* drive, a lot of people get scared by this. Do you blame them? The DoubleSpace program adds another layer of technology to a system that is already pretty complex.

In its first incarnation with MS-DOS 6.0, DoubleSpace did have a few problems. Most of them weren't caused by disk compression at all, but by another program that Microsoft included—called SmartDrive—which is a disk cache (See Chapter 14, "Good Things You Can Do for Your Disks," for the lowdown on SmartDrive). Basically, both programs are great by themselves, but when they were used together in those early versions, they were like oil and water. The DoubleSpace hidden file had a nasty habit of disappearing along with about 200 megabytes of data.

What happens when SmartDrive and DoubleSpace work together?



SmartDrive is a disk cache, which is a way to make your PC work faster. Essentially, whenever your system needs information from the hard disk, SmartDrive gets a little more than the PC asks for and stores the extra information in memory. The next time something is needed from the hard disk, SmartDrive offers the extra information that it already grabbed. If it guessed right and grabbed the right stuff, your PC works faster because it doesn't have to read from the slower hard disk.

This is called **read-ahead caching**, but SmartDrive also has something called **write-behind caching**. That means it tries to save up all the things you write to your hard disk so it can do it all in one operation. Sounds great, unless you turn your PC off before the cache is saved to the disk. Then you lose some data that you thought you had saved. That data might be one file, but if it was the DoubleSpace hidden file, then you lose your entire drive C:. Oops.

With MS-DOS 6.2 and higher, SmartDrive no longer installs as a write-behind cache, so the problem doesn't exist. In 6.0, you can avoid possible problems by following two simple rules. First, never turn off your PC when you're still in a software program. Make sure you get to the DOS prompt first. And once you're at the DOS prompt, wait *30 seconds* before you shut down. That gives SmartDrive lots of time to **commit** the cache to the disk.

With MS-DOS version 6.2, this little problem was rectified and today, DoubleSpace (or DriveSpace) is a pretty safe way to almost double the size of your hard disk without really having to buy a new one.

Precautions to take before compressing

DoubleSpace is pretty careful about messing with your disk, but it doesn't hurt to take a few precautions first. The first is to perform a full backup of your hard disk. If you think you need DoubleSpace, your hard disk probably isn't very big, so you don't have an excuse. A disk compression routine is a fairly complex operation and a little insurance won't hurt. Besides, if you perform the backup, you guarantee you'll never need it. (This is an old axiom similar to peanut butter sandwiches always falling on the floor peanut butter side down. A properly backed up drive never fails.)

Another useful pre-compression operation would be to run the DOS command, SCANDISK (see Chapter 14, "Good Things You Can Do for Your Disks"). There's potential disaster in compressing data on a disk that has bad areas on it and ScanDisk can find them and remember not to use them. If you are using DriveSpace with DOS 6.22, the ScanDisk operation will be automatically done for you, so you don't have to.

<Caution> Windows users must disable the swap file when DoubleSpace is being installed, and then recreate the file on the *uncompressed* drive after the disk compression has been completed. This is not as difficult as it sounds. See the sidebar on the next page for a step-by-step-procedure.

Now compress the disk

Whether you use DoubleSpace or DriveSpace at this point, there's no difference to you, because they are functionally identical from your point of view.

(Tip)

You might want to do this in the evening or when you won't need the PC for a few hours.

1. Get to the C: prompt by exiting all software. In Windows, this means choosing File, Exit from the menu, *not* clicking the MS-DOS Prompt icon.
2. Start the compression routine by typing **dblspace** in DOS 6.2, or **drvspace** in DOS 6.22. The program takes a few seconds to load.
3. A message on your screen will ask if you want the Express or Custom setup. Choose Express, unless your hard disk is another letter than C:. If this is the case, then you need to choose Custom setup, but get somebody technical to help you. Some of the questions and options in Custom setup are a little far out.

If I use Windows, how do I install DoubleSpace?

If you use Windows, you must disable the swap file before installing DoubleSpace. Follow these steps:

1. From the Program Manager, open Control Panel and click the 386 Enhanced icon.
2. Click the button marked Virtual Memory. Click Change.
3. In the box marked Type, choose None, and then click OK. Windows will ask if you're sure and then it will restart Windows. You can exit to DOS as soon as Windows reloads, so that you can start the DoubleSpace procedure.

After DoubleSpace is set up, you can safely turn the swap file on again. Follow the same procedure, but after you click the Change button, click the Drive box and select the drive letter of the *uncompressed* drive. (It's usually H:, but other letters are possible.) Then change the type from None to Permanent. Windows will suggest a size for your new swap file. Just click OK to accept it, and you're up and running again.

4 Before the compression routine begins, you have the chance to say what the *uncompressed* drive letter will be. By default, the suggested drive letter is H:. (I made mine D: because it seemed like a good thing to do at the time.) Press Enter to go on to the next step.

{Note}

DoubleSpace suggests H: as the compressed drive because it wants to leave four drive letters free in between, in case you decide to compress other drives later (or maybe a floppy). Any future compressed drives will get the letters G:, F:, and so on. Since I only have one hard disk and I never compress floppies, I chose D: to keep my drive letters consecutive. If in doubt, just go with the letter the program suggests.

5 Your hard disk is analyzed for you, and an estimate of the total time to perform the job will appear on the screen. This is about one minute per megabyte of data, so a 120 megabyte drive will take about two hours. You can type a **c** to continue or press Esc to bail out and forget it.

6 Go away and find a book to read. When the compression is finished, a summary screen will appear, telling you what happened to your drive. Press Enter and the system reboots with the new compressed drive appearing as drive C:

From that point on, DoubleSpace (or DriveSpace) works invisibly in the background. You'll never even know you have it, except for the fact that your hard disk holds a lot more stuff.

(Tip)

If you have an emergency boot floppy for your system, copy your CONFIG.SYS file onto that disk after the compression is done. There are references to important files in CONFIG.SYS that make DoubleSpace work. Without this file on your boot floppy, you won't be able to read the compressed drive when you boot from the floppy.

How to update from DoubleSpace to DriveSpace

If you've just upgraded from DOS 6 or 6.2 to DOS 6.22, your old DoubleSpace will still work fine, but Microsoft recommends that you convert to the newer DriveSpace. Don't worry, it won't hurt at all and you won't notice the difference. It doesn't even take as long to convert your drive as it took to perform the original compression. DriveSpace converts about 3 megabytes of data every minute.

As with the original compression, I still recommend having a full backup of all the files on your drive. You can never be too careful with this kind of stuff. You'll also have to give DriveSpace some room to work. If your drive is totally packed up to the eyeballs, the conversion won't work at all. Make sure you have about 500K free on the uncompressed drive (probably H:) and about four or five megabytes free on the compressed drive C:. Use DIR to check, copy a few files onto floppies, and then delete the originals to free up space if you have to.

{Note}

If your DoubleSpaced drive really is that full, then maybe you should consider buying a second hard disk after all. You are really pushing the limits of disk compression when your *compressed* drive starts filling up.

Type **drvspace** to load the new compression program. It will warn you to back up first, but you already did, right? Just press Enter to start the conversion. Since your drive is already DoubleSpaced, the system knows you want to do a conversion. Just let it do its thing. It will run SCANDISK by itself just to check things out.

When the job is done, you press Enter once and the system will reboot with the new compression method automatically loaded. As with DoubleSpace, you simply forget that it's there and save your work to drive C: as you normally would. Only you and DOS know that your C: is really a special file and not a real hard disk.

What if the compressed drive isn't big enough?

Remember that when you use disk compression, you actually have two drive letters afterwards. One is C:, which is the compressed drive, and the other is probably H:, which is the uncompressed part of your hard disk. If you find that your compressed drive is a little too small one day, you can adjust the size of the drive by telling it to expand into more of the uncompressed portion. Of course you have to have room to spare on the uncompressed drive to make this work.

1. At the C: prompt, type **dblspace** or **drvspace** exactly as you would to compress a new disk. Since disk compression is already running on your system, you get something new called the **maintenance program**.
2. There's a menu at the top of the screen that you access with a mouse or by pressing the Alt key on your keyboard. Select Drive by clicking it or by pressing Alt-D.
3. Select the Change Size command by clicking with the mouse or by pressing **s**.

   A dialog box pops up showing the compression statistics for your hard disk. It looks like techno-babble so don't worry. What you're looking for is the dialog box where you can type the *new free space* for your uncompressed drive.
4. You simply type a new number here and press Enter. If you had five megabytes free, you might want to type a **2**. If you had two megabytes free, you might want to type **1**.

   The difference between the old number and the new number will automatically be given to the compressed drive, and your drive C: will become bigger by at least that amount.

Changing the size of the compressed drive will take a long time, so go finish the book you started when you first installed the disk compression. When everything is done, exit the program by choosing Drive, Exit from the menu.

You can even compress floppy disks

DoubleSpace and DriveSpace work on floppy diskettes as well, but only if your hard disk is already compressed. By compressing the data on a floppy disk, you can just about double the amount of data that it can hold. Compress a floppy by typing **dblspace** or **drvspace** at the C: prompt. This loads the maintenance program again.

1. Select Compress from the menu, then Existing Drive.
2. Highlight the drive letter you want to compress (either A: or B:), and press Enter. Then press **c** to continue.

   SCANDISK will run automatically and then the compression will take place. This is much faster than your hard disk because the disk is so much smaller. You should only have to wait about a minute.
3. Once the job is finished, exit to DOS with the Drive, Exit command.

You can use your floppy like any other. As with a compressed hard disk, the actual work is done in the background and you never have to worry about it.

What's good about floppy compression?

The major advantage is that you can fit large files on a single floppy that you would otherwise not be able to copy. Huge files over a megabyte do exist, especially with some of the newer, more complicated programs and games. You might also need to keep a bunch of files together as a group. If their total size exceeds the capacity of a standard floppy, you might have to go the DoubleSpace route.

Okay, what's not so good about it?

First of all, it's a lot of fuss to go through when you consider the price of diskettes today. If you don't have any of those monster files, you probably will never even consider disk compression for floppies.

Think about what we use floppies for. Primarily, they are a way of transporting information from one PC to another. If the second PC doesn't use DoubleSpace or DriveSpace then the diskette is useless.

If you use the older DoubleSpace from MS-DOS version 6.0 and you compress floppies, even *you* can't read them without giving a special command to DOS to **mount** the floppy disk. You have to type **dblspace mount a:** (or **b:** if that's the drive) anytime you insert a DoubleSpaced floppy diskette.

> **Plain English, please!**
>
> The term **mount** comes from the old computer days when technicians had to carry really, huge hard disks around in vaults and *mount* them into special readers when someone needed some data from one of the disks. With compressed floppies, you use it to tell DOS that it should read the floppy disk in a special way.

Changed your mind? Get rid of the compression

If you decide that disk compression is not your cup of tea, you can remove it from your system if the following things are all true:

- You aren't using DoubleSpace from MS-DOS 6.0. There's *no way* to get rid of that one.
- The size of the files on your drive will not exceed the capacity of the drive after they are uncompressed. You might have to do some fancy floppy copying followed by deleting if you want to clear out enough room.
- You have a couple of hours to kill. Uncompression takes about as long as the original compression operation.

If you still want to go through with it, back up everything for safety, then muster up your courage and type **dblspace** (or **drvspace**, of course). The maintenance program will appear. Select Tools, Uncompress from the menu and follow the instructions on-screen. It's almost too easy and you'll get an error message right away if the uncompressed files will take up too much space on the disk. If this happens, you'll have to exit, delete a few more files, and try again.

{Note}

Actually, there *are* a couple of ways to remove DoubleSpace from a DOS 6.0 system, but none of them are for the faint of heart. First of all, you could upgrade to DOS 6.22, convert it all to DriveSpace, and then uninstall it. Another option is to back up all the files on your system, except for the ones that load DoubleSpace. Then, format your entire hard drive to erase it and restore the files from the backups. This looks like a job for Super Techy, wouldn't you agree?

25 Cool DOS Tools: DOS Shell, Help, and Batch Files

This chapter introduces some of the niftiest and least-used features of DOS. Some of it is actually fun!

In this chapter:

- Hate the DOS prompt? Try the DOS Shell!
- Can I get some help here? How to use the DOS Help feature
- Write your own batch files

If you've had a chance to see some flashier programs, like Windows, you know DOS comes up short in the personality department. It's pretty bleak actually, just printing words on your screen. Guess what? Hidden behind that cold, colorless prompt lies a whole new world of menus, mice, and color. Microsoft has thoughtfully added a few useful tools to different versions of DOS over the years, and most of them can be easier to work with than the DOS prompt. Of particular note are the DOS Shell and MS-Help.

If even *that* doesn't do it for you, you can jazz up your DOS prompt and, in general, make DOS more "friendly" by creating custom batch files.

The DOS Shell: A kind of DOS for the mouse

Beginning with Version 4.0, DOS got a pretty mask to wear, called the **DOS Shell**. You can use the DOS Shell to enter commands and manage disks, files,

and programs. The Shell isn't a replacement for DOS, just an alternative. Are you a "have" or a "have not?" Consult the following table to find out.

DOS version	Do you have the DOS Shell?
DOS 1.0 through DOS 3.3	No
DOS 4.x	Yes
DOS 5.x	Yes
DOS 6.0 and DOS 6.1	Yes
DOS 6.2	No, unless you had DOS 5.x or an earlier DOS 6 first

Why should I use the DOS Shell?

Here are a few reasons why some people think the DOS Shell is easier to use than the DOS command line:

- The DOS Shell uses plain English menu commands instead of cryptic abbreviations.
- You can use a mouse in the DOS Shell, instead of relying on your typing skills.
- When you do need to type information, the DOS Shell asks you a specific question.
- You can start more than one program at a time with the DOS Shell, and switch back and forth between them without closing one and reopening another.

Here's how you start the DOS Shell

To start the DOS Shell program, at the DOS prompt type:

dosshell

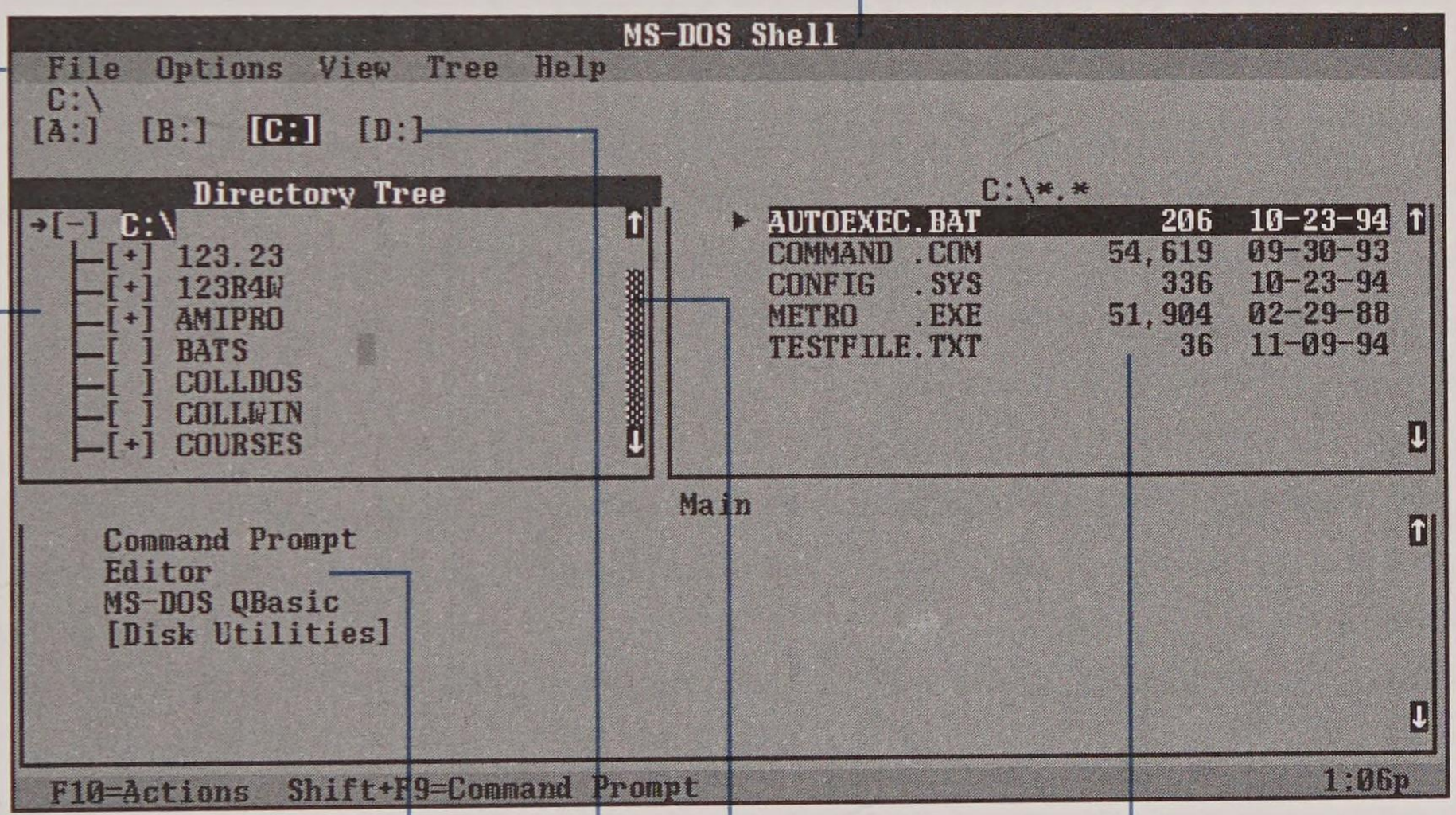
After a few seconds, the Shell appears on your screen.

What is this stuff all over my screen?

The DOS Shell screen shows the drives, directories, and files of your system in a more visual manner than plain old DOS.

Menu bar
Provides access to common DOS commands—you can even use menus with the mouse.

Title bar
Reminds you of the program you're running.



Directory tree
This window shows all the directories on the currently selected drive.

Program list
Use the program list as a shortcut to load and run programs that you use often.

Scroll bar
This mouse tool helps you see parts of the lists that don't fit in the window. Click on the arrows at either end of the scroll bar to scroll through the list.

File list
This window shows all the files in the currently selected directory.

Drive icons
You use these to view the files on other drives on your system.

Q&A

Uh oh. `Bad command or file name.`

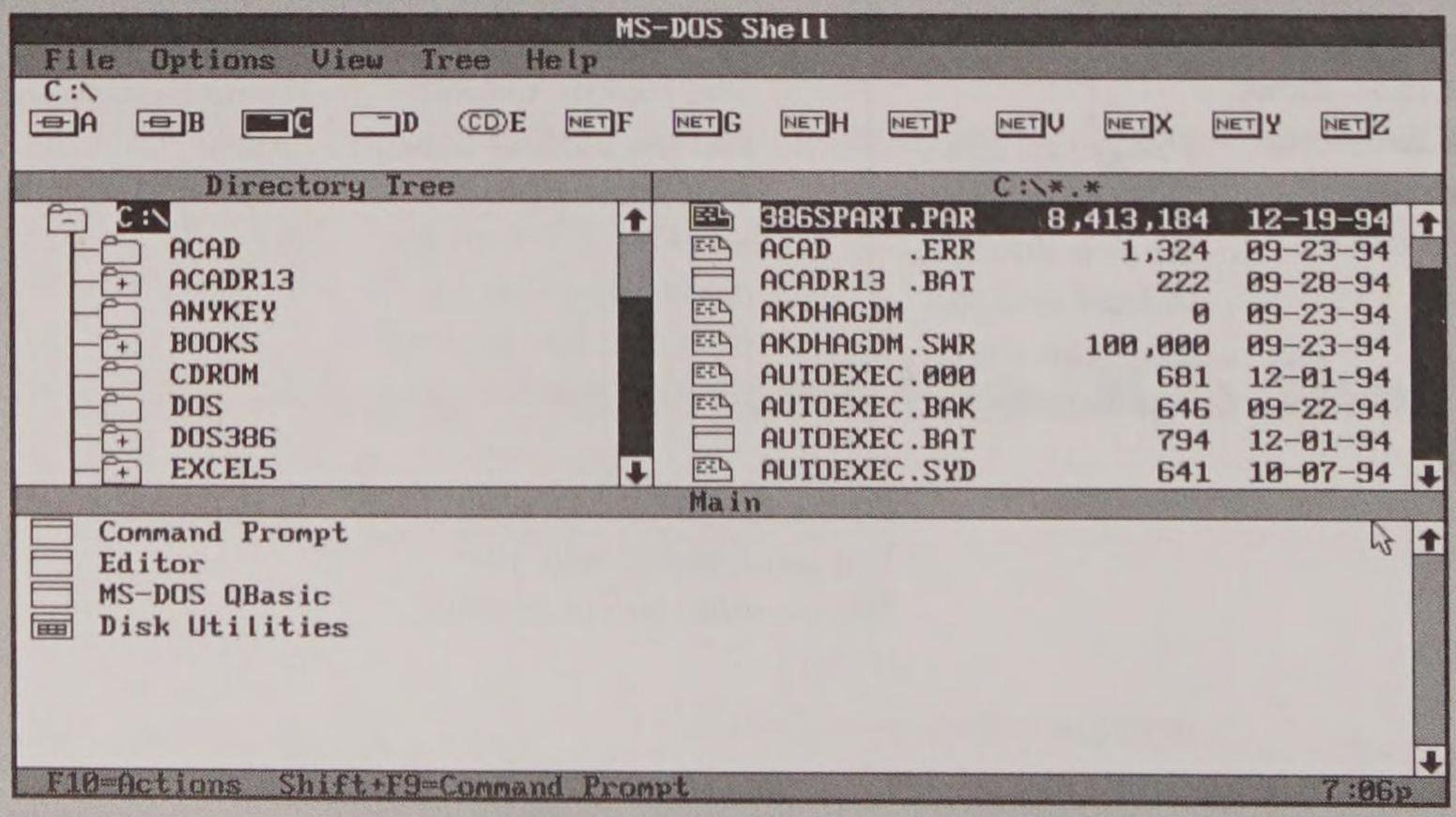
Try typing **\dos\dosshell**. If that doesn't work, you may not have the DOS Shell at all. You can order it from Microsoft, or ask your favorite techy to install it for you. If you don't have DOS Shell, don't bother reading this. Skip ahead to the section on getting help.

The coolest DOS Shell trick of all

You can use the DOS Shell to change the mode setting of your monitor from text (the usual) to graphics (*much* cooler-looking). You can even squeeze the text on the display to get more lines on there, if you're one of those folks who likes tiny type. In either case, open the Options menu, choose Display, and highlight one of the graphics settings. 25 lines is the minimum, and probably the one you'll like best, but most monitors also allow 30, 43, even 60 lines! After you choose a resolution, choose OK.

After you change the setting, notice the difference in the look of the DOS Shell (see the figure). You may also see a difference in some of your other DOS-based programs.

If you have one of the rare computers that go haywire if you attempt to change the video mode, don't panic. Just reboot the computer to return it to its normal video settings. Then, before you run DOS Shell again, delete the DOSSHELL.INI file from your \DOS directory. This will keep DOS Shell from trying to switch video modes the next time you run it.



Hey! I get to use my mouse?

If you have a mouse and it's hooked up to your PC the right way, you will see a **mouse pointer** in the middle of the DOS Shell. It might be a rectangular block or it might be an arrow, depending on your monitor setup.

The mouse pointer shows the position of the mouse. To move the mouse pointer, move the mouse. If you want to move the mouse without moving the mouse pointer, pick up the mouse.

> ***Plain English, please!***
>
> To **point** means to move the mouse so that the pointer moves to touch an item on the screen. To **click** means to press and release the left mouse button. To **double-click** means to press and release the left mouse button two times fast.

Click a command, any command

The menu in the DOS Shell works just like the menus in the MS-DOS Editor and in Windows (also in most programs). Follow these steps to open a menu:

1. Move your mouse pointer so that it touches the menu you want to open.
2. Click the left mouse button.

> **(Tip)**
>
> With the keyboard, you can press Alt to highlight the menu bar, then press the highlighted letter in the menu name. To open the File menu, you press Alt, then F. To choose a command from an open menu, press the highlighted letter in the command name.

A menu **drops down** on your screen, full of commands (see fig. 25.1). Some of the commands might be **grayed**, or **dimmed**, which means you can't use them right now. To close a menu without making a selection, simply click the same menu name again, or press Esc.

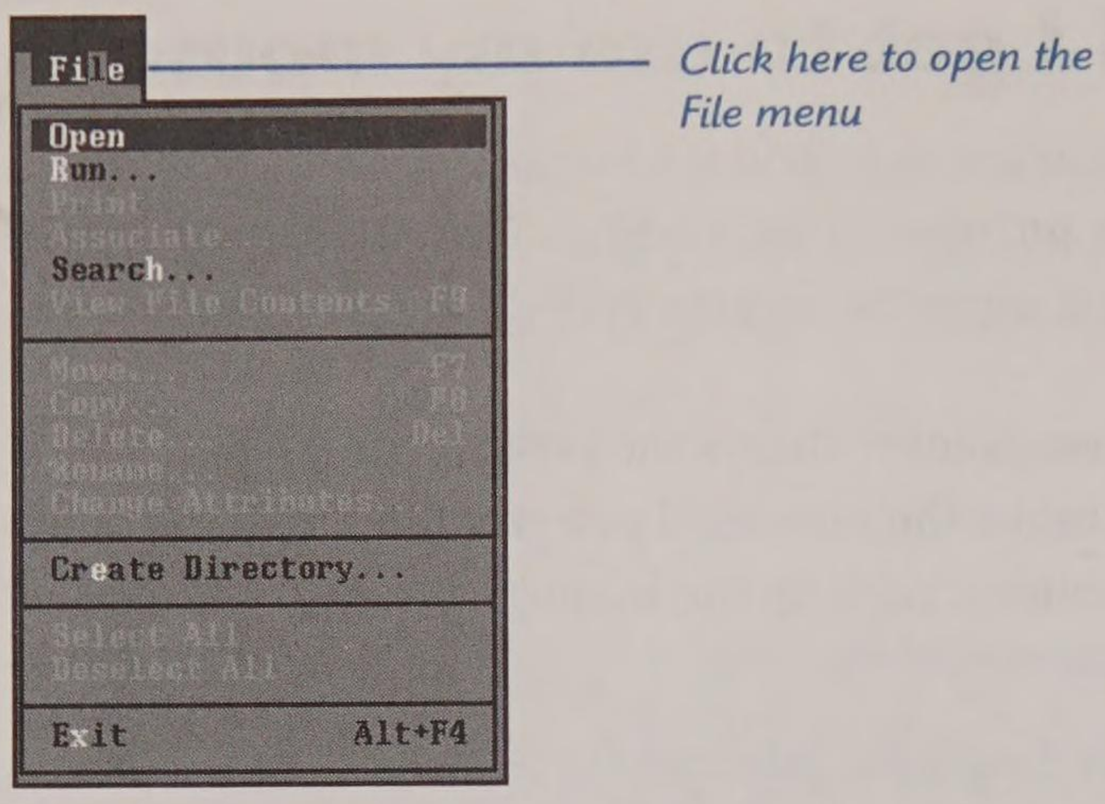


Fig. 25.1
Drop-down menus contain all the DOS commands you can type at the DOS prompt.

File listings are a snap—without DIR!

To see the files stored on another drive, click a drive icon at the top of the screen. DOS Shell automatically displays whatever directories and files are located on that drive. For example, to see files on a disk in drive A:, put the disk in drive A:, then point at the drive icon labeled `A:` and click.

To open a directory, click its name on the directory tree that appears on the left side of the screen. All the files and directories that it contains are displayed in the file list, on the right side of the screen. If there's a plus sign next to the directory name, it has subdirectories in it. Click the plus sign (+) to add the subdirectories to the directory tree. Click the minus sign (-) to hide the subdirectories again. To see *all* the subdirectories on a drive, choose Tree, Expand All.

It's easy to select files with DOS Shell

In DOS Shell, you first select a file by clicking on its name, then you decide what to do with it. To select multiple files that are listed together in a row, click the first one you want, hold down Shift, and click the last one you want. If the files you want are scattered around, click the first one. Then hold down Ctrl as you click the second file you want, the third, and so on (see fig. 25.2).

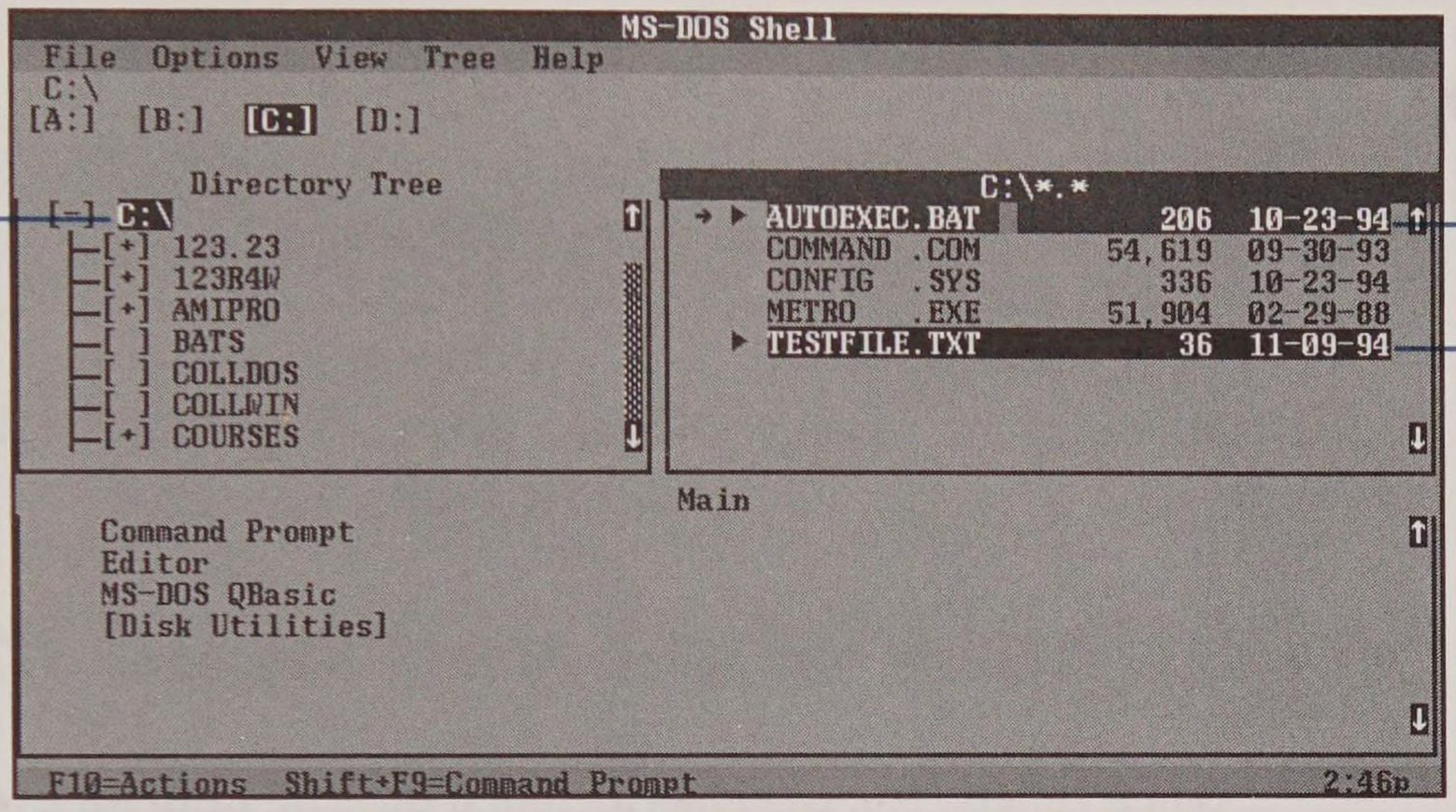


Fig. 25.2
If you press the Ctrl key while clicking on file names, you can select more than one at a time.

It's easy to use a menu command, too

Suppose you wanted to copy TESTFILE.TXT to a floppy diskette in drive A:. First, make sure there's a blank floppy disk in drive A:, then:

1. Click on the file TESTFILE.TXT (or any other file that suits your fancy) to select it.
2. Choose File, Copy. A large box (called a **dialog box**) opens on the screen (see fig. 25.3).

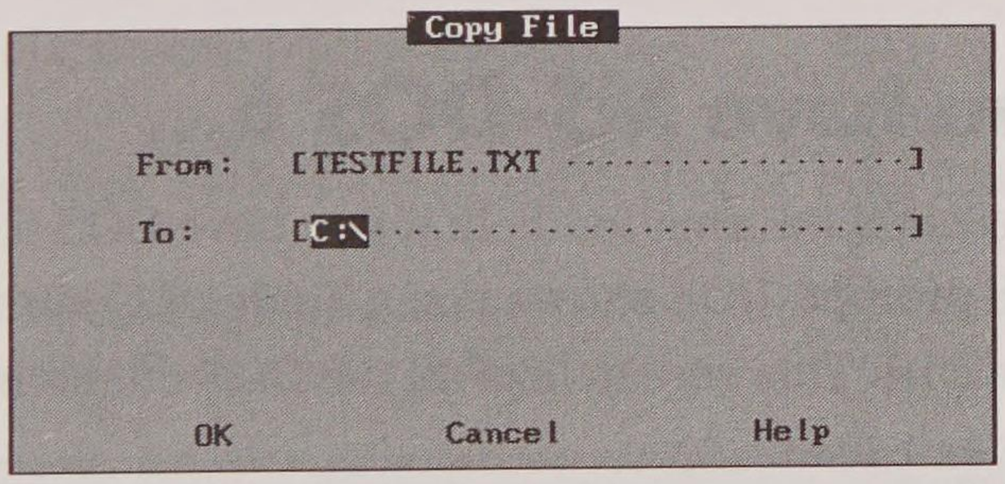


Fig. 25.3
To copy a file, just tell DOS Shell where to copy it to.

3. Type **a:** on the To line.
4. Press Enter, or click OK.

DOS Shell copies the file to the disk in drive A:.

Once you know how to make selections and use commands, you can use the DOS Shell to handle most of your file management functions, instead of using DIR, MD, RD, DEL, and so on. You don't need to learn each command, just look for it on a menu.

(Tip)

You can start programs from the DOS Shell, too. Just open the directory that contains the program you want to run; then double-click the program file (it probably has an EXE extension). The program starts!

Had enough? To get back to the DOS prompt, choose File, Exit, or press F3.

How to get help when you need it

Since version 5.0, DOS has included **on-line help** for every DOS command. In version 6.0 and later, they went a step further and put the entire DOS manual on your hard disk, where you can get at it quickly and easily. If you have a question about a DOS command, the HELP system is there to, well...*help*, of course.

Plain English, please!

On-line just means that the information is stored on disk where it's available instantly. DOS also includes handy features to help you find the information you need and display it on-screen. Read on for more details.

If you have MS-DOS 6...

To get general information help if you have DOS 6.0 or later, just type **help** at the DOS prompt. DOS shows you a Table of Contents, that looks like the one in figure 25.4. This screen lists all the DOS commands. Press PgDn on your keyboard to see more.

Fig. 25.4
DOS can give you help on any command.

```
File  Search                                                    Help
                    MS-DOS Help: Command Reference

Use the scroll bars to see more commands. Or, press the PAGE DOWN key. For
more information about using MS-DOS Help, choose How to Use MS-DOS Help
from the Help menu, or press F1. To exit MS-DOS Help, press ALT, F, X.

<What's New in MS-DOS 6.2?>

<ANSI.SYS>              <Erase>             <Nlsfunc>
<Append>                <Exit>              <Numlock>
<Attrib>                <Expand>            <Path>
<Batch commands>        <Fasthelp>          <Pause>
<Break>                 <Fastopen>          <Power>
<Buffers>               <Fc>                <POWER.EXE>
<Call>                  <Fcbs>              <Print>
<Cd>                    <Fdisk>             <Prompt>
<Chcp>                  <Files>             <Qbasic>
<Chdir>                 <Find>              <RAMDRIVE.SYS>
<Chkdsk>                <For>               <Rd>
<CHKSTATE.SYS>          <Format>            <Rem>
<Choice>                <Goto>              <Ren>
<Cls>                   <Graphics>          <Rename>
<Command>               <Help>              <Replace>
<Alt+C=Contents> <Alt+N=Next> <Alt+B=Back>              N 00006:002
```

To find out more about a command, press the arrow keys to move the blinking cursor to the command, and then press Enter. To move faster, press Tab. To move backward, press Shift-Tab. If you have a mouse, just click the command you want help with.

DOS displays a whole screen full of stuff explaining how to use the command. In figure 25.5, DOS fully describes the DOS Shell, which you start with the DOSSHELL command.

Press PgUp and PgDn to see parts of the text that don't fit on the screen, or use your mouse with the scroll bar.

To get back to the DOS prompt, choose File, Exit from the menu.

To see some explanatory notes, highlight Notes, then press Enter

Fig. 25.5
Here's the DOS help screen for the DOSSHELL command.

To see examples of the command in action, highlight Examples at the top of the screen, then press Enter

```
File  Search                                                    Help
                    MS-DOS Help: DOSSHELL
◄Notes►  ◄Example►

                                DOSSHELL

Starts MS-DOS Shell, a graphical interface to MS-DOS.

MS-DOS Shell is included with MS-DOS 6.0 and earlier; it is not included
with MS-DOS 6.2. MS-DOS Shell is available in the MS-DOS 6.2 Resource Kit.
To order the Resource Kit, use the coupon in the back of your MS-DOS 6
User's Guide.

Syntax

To start MS-DOS Shell in text mode, use the following syntax:

    DOSSHELL [/T[:res[n]]] [/B]

To start MS-DOS Shell in graphics mode, use the following syntax:

    DOSSHELL [/G[:res[n]]] [/B]

<Alt+C=Contents> <Alt+N=Next> <Alt+B=Back>              N 00001:002
```

Here's another version

Okay, so you know the name of the command you need help on, and you don't want to mess around in that table of contents. Use the command name as a parameter to the HELP command, and voila!, you jump right to the correct help screen.

{Note} This method works for DOS 6, but it's *the only way to get help at all in DOS 5.*

To get help on the UNFORMAT command, for example, type this:

help unformat

<Caution> If you're connected to a network, you may get a surprise when you type **help** at a DOS prompt—you may get the network's help feature instead of the DOS help feature. Try pressing Esc or choosing File, Exit. If you can't get back out, grab your network administrator. On these kinds of systems, the only way to get DOS help is to type the name of the command followed by **/?**.

DOS shows you the screen of information about the UNFORMAT command.

(Tip) DOS 6 has a FASTHELP command, too. Instead of giving you lots of information about the command, it gives you a one-line description of each DOS command. Type **fasthelp** followed by a space and the name of the command for which you want info.

Anybody can write batch files

Did you ever wish you didn't have to type the same series of commands at the DOS prompt every time you want to do something, like start a program? After all, aren't computers supposed to be good at taking over repetitive tasks? Your wish can come true, thanks to a feature of DOS called **batch files**.

> ***Plain English, please!***
>
> A **batch file** is simply a batch of DOS commands stored in a file. The file has the extension BAT (short for *batch*). Once you create a batch file, you can run the whole list of commands in the file by telling DOS to run the batch file.

It's like writing down step-by-step instructions for a procedure such as placing a long distance call with a calling card. Then, if a co-worker asks how to make a call, you don't have to explain each step. Instead, you can just hand them the instructions and tell them to follow the directions. It saves you a lot of time.

A batch file *is* a computer program. But don't let that scare you. This is programming anyone can do. At their simplest, batch files are nothing more than the same commands you would type at the DOS prompt. To create a batch file, you type the commands and save them in a plain text file. Then, when you want to repeat those same commands, you won't have to type them at the DOS prompt; you can just tell DOS to go find the batch file and execute the commands it contains.

Okay, show me an example

Here's a simple batch file that starts a program:

```
c:
cd \wordpro
fastword
cd \
menu
```

The first line switches you from wherever you are to drive C:. The second line changes to the WORDPRO directory (this is a made-up example). Once you're in the WORDPRO directory, the third line starts the program called FastWord with its starting command: **fastword** (this is another made-up name). After you fool around in the FastWord program for awhile, you can exit the program as usual. When you do, the batch file will resume where it left off, at the fourth line, which switches you to the root directory. The last line runs a menu program that starts with the command **menu**.

Why would I want a batch file?

You type only a single command to run the batch file, and that time savings is reason enough for most of us to create and use any number of batch files. But there are some other reasons as well:

- A batch file reduces a series of commands to one easy-to-remember file name. For instance, it's much easier to start your word processor by typing something like GOWP (short for *go word processing*) than to have to remember the exact name of the program file, what directory it's in, and any other commands that are required to start the program.
- Using batch files can eliminate common mistakes, such as typing errors and the all-too-human tendency to forget a step in a sequence of commands.
- A programmer can create batch files that can do things that you can't do at the DOS prompt.

How to name and run a batch file

Batch files are one of a special class of files that DOS recognizes as executable program files. Which just means that DOS realizes that batch files aren't merely data for some other program—they are programs that DOS can run.

DOS recognizes batch files by the extension BAT. So, in naming your batch files, you can use any normal eight-character file name plus the BAT extension.

Q&A

Can I name my batch file anything I want?

Well, there are a few names you must avoid. You can't give a batch file a name that DOS would confuse with one if its own commands. For example, COPY.BAT is no good because DOS would run the COPY command instead of the batch file.

To run a batch file, you just type the file name. You don't have to type the BAT extension (although it won't hurt anything if you do). So, to run the batch file named GOWP.BAT, you simply type

gowp

When you type something on the command line that DOS can't identify as one of its own commands, it will start looking for an executable file with that name. DOS will look first in the current directory and then in each directory in your path for the executable file. Then, it will run the first file it finds with that name. If DOS finds GOWP.BAT, it'll start executing the commands listed in the file.

When naming batch files, don't use the same name as another executable file. DOS will find and run files with COM and EXE extensions before it runs BAT files.

Wait, now. AUTOEXEC.BAT is special

One of your computer's startup files—AUTOEXEC.BAT—is a batch file. It's just like other batch files, except that it runs automatically when you start your computer.

I can imagine the wheels turning in your head as you think about the possibility of other "automatic" batch files. Alas, no such luck.

AUTOEXEC.BAT is one-of-a-kind. DOS looks for a file named AUTOEXEC.BAT in the root directory of the computer's boot drive. If it finds that specific file name, it will run the batch file automatically. But there's no way to make other batch files automatic. (You can, however, have AUTOEXEC.BAT call and run other batch files.)

Some commands *only* work in batch files

Most batch files contain commands you would type at the DOS prompt. However, DOS can recognize and act on some additional commands in a batch file that are inappropriate at the DOS prompt.

Some of the special batch file commands let programmers make batch files do some fancy stuff. But some of them are easily usable by mere mortals:

CALL	Lets one batch file run another batch file and then return and continue to process the rest of the commands in the originating batch file.
ECHO	Lets you hide or display the text that appears on-screen during batch file processing. (For example, adding ECHO OFF to a batch file keeps the computer from displaying all the commands and results that follow.)
PAUSE	Temporarily suspends processing of the batch file until you press a key. You use this to tell the computer to stop and wait for you to give permission to go ahead.
REM	Marks a line of a batch file as a **remark**. Anything following REM on that line will be ignored by DOS. This lets you add human-readable notes to your batch files without confusing DOS.

There are a bunch more that really are best left to programmers: CHOICE, FOR, GOTO, LABEL, IF, and SHIFT. If you can do programming that advanced, consult a more advanced text on DOS, such as *Using MS-DOS 6.2*, Special Edition.

Okay, how can I write a batch file?

Any ASCII text editor will do the job for creating batch files. You can use the MS-DOS Editor that comes with DOS version 5 or later. (See Chapter 11 for instructions on using Editor.) Or, you can use your favorite text editor. You can even use a word processor as long as you make sure you save batch files as plain text files, not in the word processor's own file format.

In the unlikely event that you have no text editor or word processor, you can resort to a couple of crude techniques to create text files. If you're a real masochist, you can try using the EDLIN line editor supplied with even the oldest versions of DOS. A better solution for short batch files is to use the COPY CON command, as described in Chapter 6, "DOS Stuff You Can Do with Disks."

(Tip)

If you want your batch files to be always available, store them in a directory that's in your **search path**. You might even want to create a separate directory just for batch files and add it to your path.

The **search path** is a list of directories where DOS will look for executable files if it can't find them in the current directory. You define the search path with the **PATH** command—usually in your AUTOEXEC.BAT file.

For example, you might store batch files in the \BAT directory of the C: drive and make sure C:\BAT is in your search path. That way, DOS will be able to find and run your batch file no matter what drive and directory you're in when you type the file name to start the batch file.

A batch file that changes your screen prompt

Suppose you want to keep a standard prompt most of the time as established in your AUTOEXEC.BAT, but sometimes you want to add another line to the prompt to display the date and time. You can look up the codes you need to create the prompt and put them a one-line batch file. Running the batch file will change the prompt; and you won't have to memorize those codes.

For example, you could type the following line in your favorite text editor and save the file with the name PROMPT2.BAT.

```
prompt Today is $d $t$_$p $g
```

To run the batch file, you simply type **prompt2**. DOS runs the command in the file, and when the prompt returns, you'll see the following result as your new prompt.

```
Today is Thu 10-19-95  16:23:13.86

C:\ >
```

If you want to be able to change back to a simpler prompt, you could create another one-line batch file containing another PROMPT command. See DOS Help for details on the prompt codes you can use.

(Tip)

If you use Windows, you can have a different prompt when you shell to DOS from Windows. To create a special Windows prompt, you define an environment variable named WINPMT. Normally, you'd do this by adding a line like this to your AUTOEXEC.BAT file:

```
set winpmt=DOS Shell from Windows$_$p $g
```

Then, when you shell to DOS from Windows, your prompt will look like this:

```
DOS Shell from Windows
C:\WINDOWS >
```

26 Troubleshooting Tips That Anybody Can Try

In this chapter:

- What causes computer problems?
- Can't get the command to work? Try these ideas
- What to do when a program won't work
- I can't find my file!
- How to deal with common hardware problems
- Help! I need help!

It's just a machine. It's not the Great and Powerful Oz. It was built and programmed by humans and humans can fix it. Usually.

When your software or hardware doesn't work right, isolating the problem is half the battle in terms of getting it up and running again. In this chapter, we take a rational look at how and why computers don't work, and what you can do about it.

(Tip)

When something goes wrong with your computer, don't panic. The first thing to do is try again. Keep a written record of exactly what you're doing—the commands you use, the keys you press, the mouse actions you use. If there are any error messages on your screen, write them down. If you need to ask for help, this stuff will be useful in pinpointing the problem.

Four major reasons computers don't work

The causes of computer problems fall into four categories:

- People
- Software
- Viruses
- Hardware

Human error

Probably the most common reason a computer doesn't work is because someone isn't using it correctly (no offense). It's possible that the person who built the thing made a mistake. It's possible that the person who programmed the thing made a mistake. Or, most likely, it's possible that the person who is using the thing made a mistake, like typing the wrong command, or forgetting to plug in the printer.

Human error is probably the easiest to fix, so even though you may end up feeling sheepish, you should hope that you are responsible for whatever is going wrong.

Software

Problems with software programs can really ruin your day. Sometimes the programs are physically damaged when you get them. Sometimes the manufacturer didn't bother to get the bugs out before shipping it. Some programs become damaged after they've been on your computer for a while, through general wear and tear or because of a problem with your hardware. Sometimes a program may just be incompatible with your computer system.

Software problems can sometimes be resolved simply by taking the program back to where you got it, or by getting a newer version that fixes bugs. Sometimes, you can learn to live with the bugs, by avoiding certain features or keystrokes that you know don't work. Be cautious, because a software problem can start a chain reaction that ends up damaging your files.

Viruses

Ahh. The insidious software virus. Viruses cause problems of varying degrees to your hardware and your software. The results of a virus may be as benign as an annoying message that flashes on your screen when you turn on your computer, or as malignant as a file-destroying program that wipes out everything on your hard disk.

You can avoid viruses by buying software from a reputable dealer, avoiding software that appears to have been opened, never downloading software from a bulletin board service, never installing software from a disk you get from a friend, and by using an anti-virus utility to check your files and your system memory. Once a virus gets into your computer however, you have to cut your losses and get rid of every infected file as soon as possible.

Hardware

Simple breakdown of a hardware component is also a common cause of computer troubles. Nothing lasts forever, particularly when it's a piece of machinery. If one device breaks, it may seem as if your whole computer is on the fritz.

Of course, if you suspect a hardware device is broken, check to be sure it is plugged in and turned on.

Dos and Don'ts for avoiding computer problems

Dos

- Check the system requirements for a software program before you buy it
- Save your work often
- Back up! Back up! Back up!
- Use descriptive file names
- Use directories to organize your files
- Close all programs before you shut off your computer
- Write down error messages you see on your screen
- Label your disks
- Use a power-protection device
- Register your software
- Keep your disks in a safe place
- Keep your hardware clean and dry
- Unplug your computer during a thunderstorm

Don'ts

- Don't attach any hardware to your computer when the system is turned on
- Don't open the system unit unless you know what you're doing
- Don't take apart the power supply
- Don't take a disk out of a drive when the drive in-use light is on
- Don't turn off the computer when a program is running
- Don't force a disk into a drive
- Don't leave disks in the sun, on a radiator, near magnets, or on the dashboard of your car
- Don't eat or drive while working with your computer
- Don't get disks wet—actually, don't get any part of your computer wet, either
- Don't use the original program disks to install or run a software program
- Don't use borrowed disks or down-loaded programs
- Don't move a computer when it's turned on
- Don't try to format your hard disk yourself

My DOS commands don't work

If this is the fifth time in a row that DOS responds to your commands with the message `Bad command or file name`, you might think that something has gone wrong with DOS (see fig. 26.1). Maybe, but not likely. Chances are that you are typing it wrong.

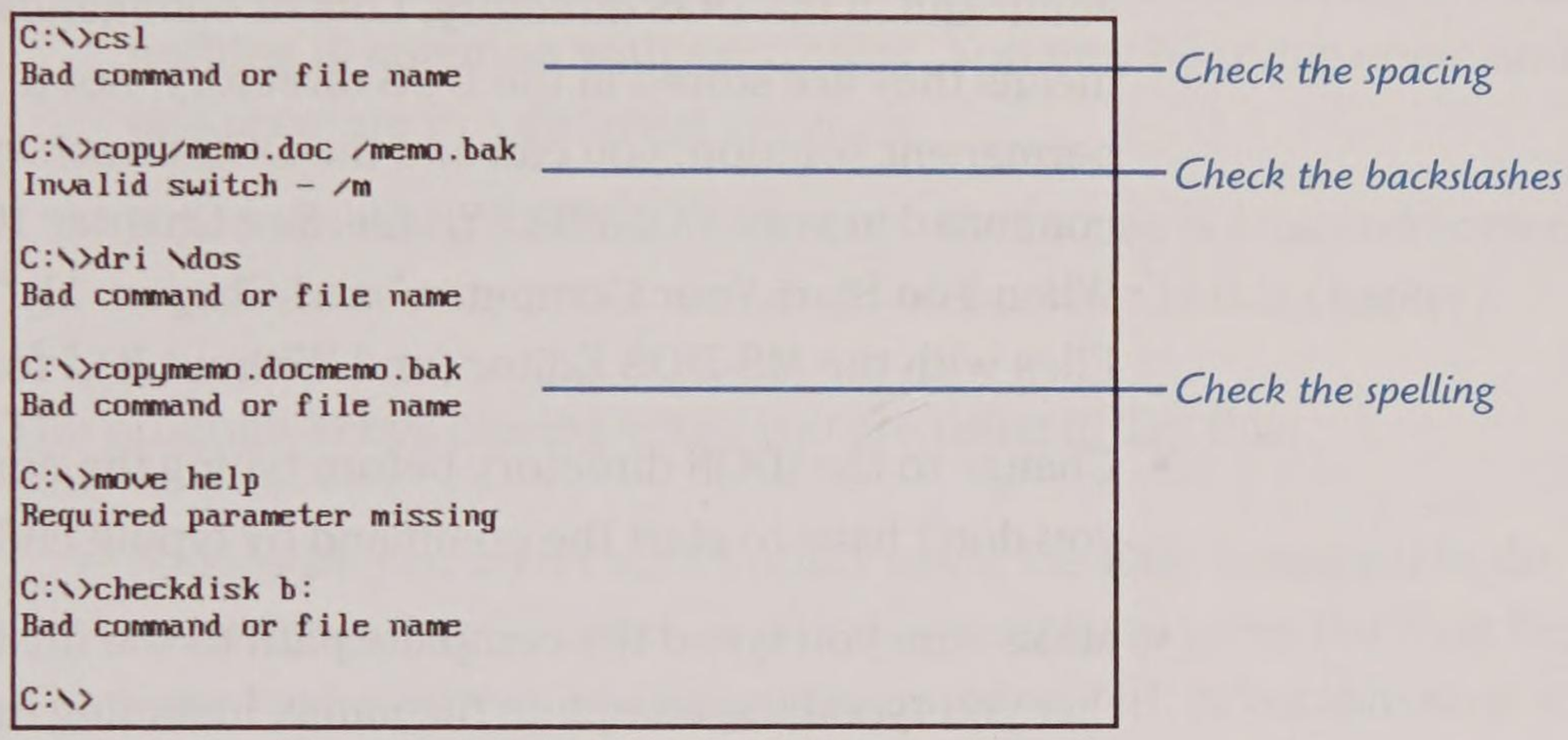


Fig. 26.1
When you keep getting the `Bad command or file name` message, check that you are entering the command correctly.

I hate this stupid syntax thing!

DOS commands must be typed *exactly* in order to work. If you get the spelling wrong, forget it. If you get the order wrong, forget it. All that happens is that darned `Bad command or file name` message or, the somewhat more descriptive, but just as irritating `Invalid parameter` message. Here's what to do:

- Check your spelling. CHKDISK won't work. CHKDSK will. DRI won't work. DIR will.
- Find the command in Chapter 27, "Mini Command Reference." You might think you can use HLP to start the Help program—you can't. If the command won't work, look it up.
- Check your syntax. Are the spaces in the right places? Did you type a backslash when you meant to type a slash? Remember, backslashes are used for directories, and slashes are used for switches. The command reference is a good place to look for this stuff, too.

Check the path

DOS has to be able to find the file that *executes* the command as well as the file *on which* the command will act. If it can't, you get an `Invalid parameter` or `Invalid path` or `Can't find file` message. Here's what to do:

- Start the command by typing **c:\dos**. This tells DOS to look for the command in the DOS directory. Lots of commands are **external**, which means they are stored in the DOS directory, not in memory. As a permanent solution, you can add the DOS directory to the PATH command in your CONFIG.SYS file. See Chapter 10, "What Happens When You Start Your Computer," and Chapter 11, "How to Edit Startup Files with the MS-DOS Editor (and Without It)," for more info.
- Change to the \DOS directory before typing the command. That way, you don't have to start the command by typing **c:\dos**.
- Make sure you typed the complete path to the file in the command, and that you typed the complete file name, including extension.
- Make sure you use backslashes, not slashes, to separate directories and file names.

This lousy program doesn't work!

You just spent a lot of money buying a software program, and now you can't use it. Before you curse out the software dealer, or go rushing back to the store to convince them to take back an open box, take a minute to figure out what's wrong.

(Tip)

Don't guess. Read the manual that came with the software, or buy a book about the program geared to your abilities. You'll save a lot of time and anguish.

Can't get in

The program won't start. You type the command at the DOS prompt and nothing happens. Try this:

- Make sure you are using the correct command to start the program. Read your software manual.
- If it still doesn't work, install it again.

The program starts, but it doesn't respond to your commands. Try this:

- Make sure you are using the correct command. DOS programs have nothing in common with each other. You may be trying commands for one program in a different program.
- If you are using a mouse, make sure the mouse is attached correctly (there's a section about mouse problems later in this chapter).

The program keeps closing while you are using it. Try this:

- Make sure you aren't accidentally using the Exit command to do something else. Sometimes, you might mean to press the Shift key on your keyboard, but you are really pressing Ctrl. In combination with another key, it might be the shortcut for Exit.
- Make sure you have enough memory and /or disk space to use the program. It might have a safety mechanism for shutting down when it doesn't have enough space to run properly.
- As a last resort, try installing it again. Some of the files might have got mixed up.

Can't get out

No matter what you do, the program won't close. Try this:

- If the program uses menus, there's probably an Exit command on the File menu or a Quit command on the main menu.
- If the program uses a command line, type Quit or Exit, then press Enter.
- Read the software manual to find out the correct command for exiting the program (see fig. 26.2).

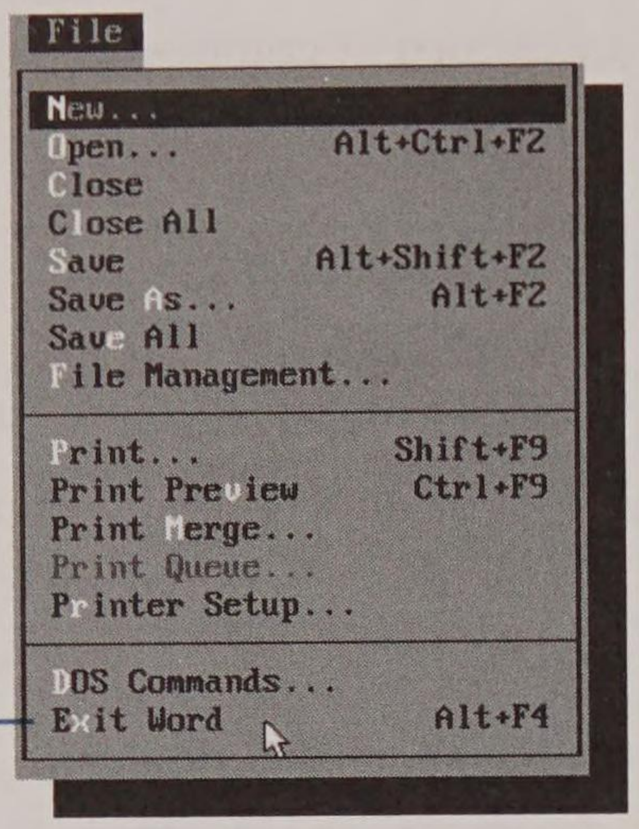


Fig. 26.2
Somewhere in the program there's a command that lets you exit.

If the Exit command won't work:

- Try using Save or Close to close your data files first. That might make the Exit command active.
- Press Esc. You may need to get back to a different part of the program before you can exit.
- As a last resort, restart your computer by pressing Ctrl-Alt-Del. If there is data that hasn't been saved, it will be lost.

(Tip)

You can also usually get information about your software program from the company that makes it. Look in the documentation for a customer servicer or support telephone number, then call it. You'll probably have to wait for hours, but when you finally reach someone, they'll be able to help you figure out what's wrong.

Where's my file?

You know you used the correct command for naming and saving a file, but now you can't find it anywhere. There are a few possible causes of this problem:

- Poor memory on your part
- Hurried use of the DEL or DELTREE command
- Poor disk labeling which leads to inopportune use of the FORMAT command

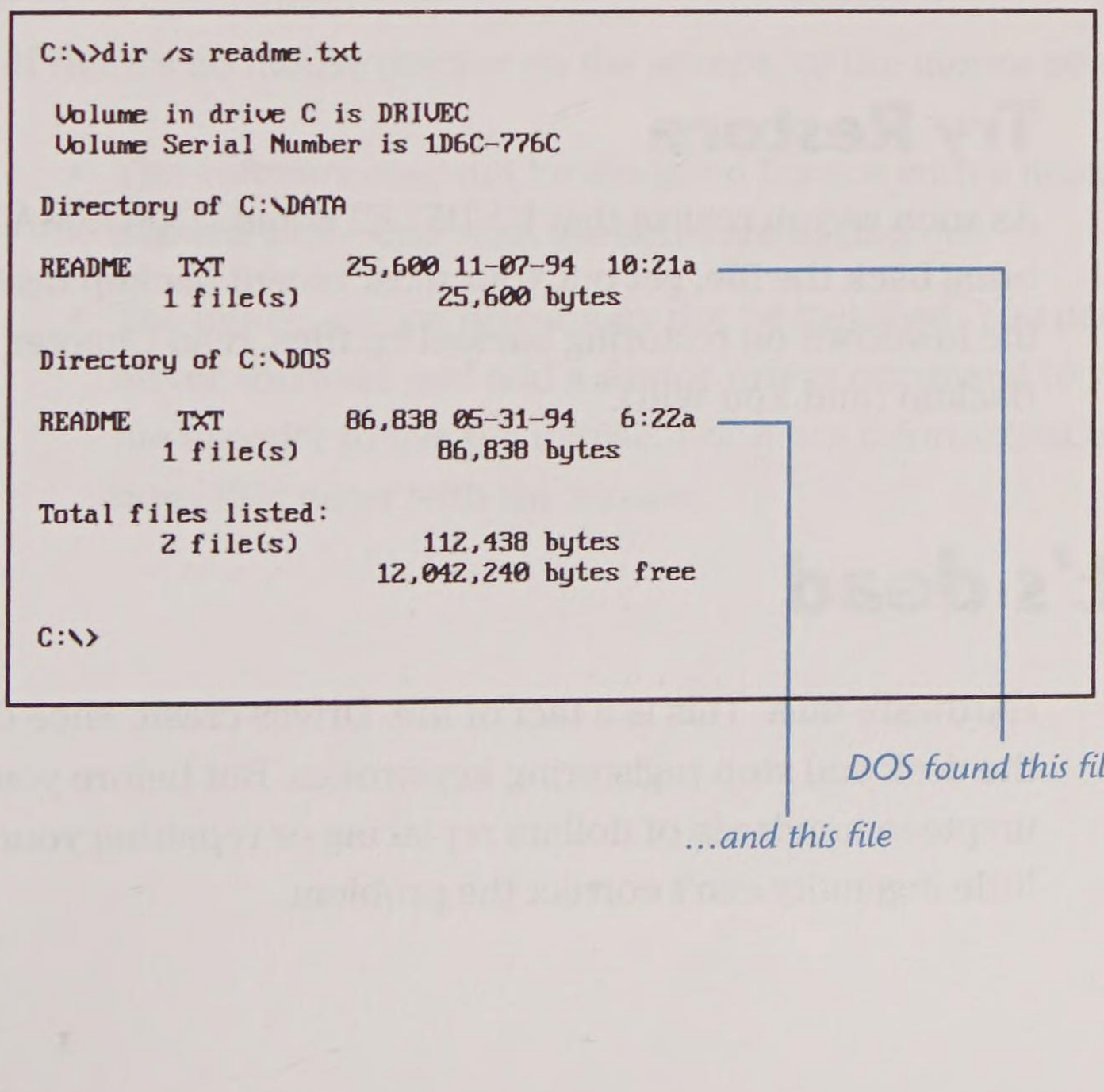
Try DIR

Before you blame DOS, check your own housekeeping. The file may be on your disk, you just don't remember where. If you think you know the file name, or even if you only know part of the file name, you can use the DIR command to track it down. Do this:

1. Type **cd ** to change to the root directory on the disk.
2. Type **dir /s** to tell DOS to list the contents of the current directory and all of its subdirectories.
3. Press the spacebar once, then type the file name and press Enter.

DOS displays all of the files with that name that are stored anywhere on your disk (see fig. 26.3). If there are too many to fit on the screen, try using the ¦MORE command.

Fig. 26.3
You can use the DIR command to find a lost file anywhere on a disk. Here, it shows you that two directories contain a file called README.TXT.



(Tip)

You can use wild card characters to list a group of files that might include the lost file. For example, if you know it has a DOC extension, you can type ***.doc**. Or, type **memo.*** if you know you named it MEMO but can't remember the file name extension.

Try UNDELETE

As soon as you realize that you accidentally deleted the file, try UNDELETE.

At the DOS prompt, type **undelete** followed by the file name. If it's there, DOS will give it back. For more info on using the UNDELETE command, read Chapter 8, "Deleting All Those Darn Copies."

Try UNFORMAT

As soon as you realize that you accidentally formatted the floppy disk where the file was stored, try UNFORMAT.

At the DOS prompt, type **unformat** followed by the disk name. If DOS can unformat the disk, it will. For more info on using the UNFORMAT command, read Chapter 6, "DOS Stuff You Can Do with Disks."

Try Restore

As soon as you realize that UNDELETE and UNFORMAT are not going to bring back the file, get out your most recent backup disks and restore! For the lowdown on restoring backed up files, read Chapter 13, "Restoring the Backup (and You Will)."

I think it's dead

Hardware fails. This is a fact of life. Drives crash. Mice die. Keyboards fall off the desk and stop registering keystrokes. But before you head out to spend umpteen hundreds of dollars replacing or repairing your equipment, see if a little ingenuity can't correct the problem.

For all types of hardware devices that aren't working, do the following:

- Check that the power cord is plugged in.
- Check that the cable to the PC is plugged in.
- Check that the power switch is turned on.

The screen is blank

Nine times out of ten, if you can't see anything on your monitor it's because the contrast and brightness controls are turned all the way off. Adjust them and see if anything appears. They work like the knobs on a TV.

The tenth time, it's because you didn't turn the monitor *on*.

This mouse has a mind of its own

If the mouse or the mouse pointer moves erratically:

- The surface you are using may be uneven or rough. Try a mouse pad.
- The tracking ball on its underside, or the internal connections, may be dirty. Get a mouse cleaning kit.

If there's no mouse pointer on the screen, or the mouse pointer won't move:

- The software may not be designed for use with a mouse. Read the manual that came with the software to find out.
- The mouse device driver may not be installed. You need to install the driver software and add a device driver command to your CONFIG.SYS file in order to use the mouse. For more information, read the instructions that came with the mouse.

It just won't start!

If absolutely nothing happens when you turn on your computer, and you're sure it's plugged in, try this:

- Check to be sure the power source is turned on. If the computer is connected to an uninterruptible power supply, or a power strip, the power supply may be off.
- Listen for the hum of the fan inside the computer. If you don't hear it, the internal power supply may not be working.
- Watch the disk drive lights. If they don't go on, the drives may be damaged or the operating system may not be loading correctly.
- Look in drive A: to see if there's a non-system disk in it. If there is, take it out.

It says it can't find the hard disk?

If you try to access your hard disk, and DOS keeps telling you that it can't find the drive, or that the drive is invalid, try this:

- Check your command. Make sure you include the colon after the drive name, like this: **c:**. Without the colon, the letter C means nothing to DOS.
- Start your computer using your emergency boot floppy and see if you can access the hard drive. If you can, then something might have happened to your CONFIG.SYS file. Copy the file from your boot disk to your root directory and try starting your computer again.

My computer can't read my floppies

Here are some reasons why your computer may not be able to read the data stored on a floppy disk:

- The data was stored in a non-compatible format. You may be able to convert the data to a format that one of your programs can read using a utility program.

- The disk is damaged. Try using ScanDisk to see if there are any problems that can be repaired. (Read Chapter 14, "Good Things You Can Do for Your Disks," to learn about ScanDisk.)
- The disk isn't inserted correctly. Make sure the disk is in the drive all the way. For 5.25-inch drives, make sure the drive door is closed. Also, make sure the disk isn't upside down—I know it sounds nuts, but it can happen.
- The disk hasn't been formatted. DOS can't use a disk until it has been formatted. Use the FORMAT command to format the disk. (Read Chapter 6, "DOS Stuff You Can Do with Disks," to learn about formatting.)

What is with this printer?!

If the printer won't print, try the following:

- Check that the printer is connected correctly.
- Check the printer setup command in the program to make sure the software knows what type of printer you are using and to which port the printer is connected.
- Check that the paper is loaded correctly.
- Check that the printer on-line, or status, light is on.
- Read the instructions that came with the printer to be sure that the printer device driver is installed correctly.

If the printer won't stop printing, try this:

- Shut the printer off and then turn it back on.
- Close the program you're using to print.
- In Windows, close the Print Manager.

Can someone help me?

When you've tried everything and you still can't fix the problem, find someone who can. Here are some ideas for locating the following people who can help:

- Your local computer nerd. Every business, neighborhood, or family has one. They might even have job titles, like Help Desk Technician or Customer Support Manager.
- The dealer where you bought the equipment—hardware or software.
- The manufacturer of the equipment—hardware or software.
- A computer user's group. Check your telephone book for local listings.
- A local school. Lots of high schools and colleges have computer labs that are open to the public at certain times.
- The Information Superhighway. If you have access to the Internet, it's loaded with user groups and manufacturer support stuff. You can get in via an on-line service, like CompuServe, America Online, or GEnie.

27 Mini Command Reference

Tear these pages out and pin them all over your wall! DOS 6.x contains more than 100 commands. Learning how to use them all would be a formidable task. But you're only likely to need a handful of those commands to get your day-to-day work done. With that in mind, here's a quick reference for the top DOS commands—the ones you're likely to use the most. The commands may have other functions or other switches or options than those mentioned here; remember, these are the most common usages.

They're divided into four categories:

- Commands that work with files and directories:

BACKUP and RESTORE	MD
CD	MOVE
COPY	RD
DEL	REN
DELTREE	UNDEL
DIR	XCOPY

- Commands that work with disks:

CHKDSK	LABEL
DEFRAG	SCANDISK
DISKCOPY	UNFORMAT
FORMAT	

- Commands that work with your system:

CLS	PATH
DATE	PROMPT

EXIT
HELP and FASTHELP
MEM
TIME
TYPE

- Helpful utility programs:

DBLSPACE and DRVSPACE
DOSSHELL
EDIT
MEMMAKER
MSAVE and VSAFE
MSBACKUP
MSD
SMARTDRV

The commands in this chapter appear in all CAPS. Parameters following the commands appear in *italics*. Square brackets enclose placeholders for the information you'll need to supply as parameters. For example:

COMMAND *parameter1*[filename.ext] *parameter2*[drive][path]

{Note} This list was compiled based on DOS 6. Older DOS versions may not support all of these commands.

Commands that work with files and directories

BACKUP
RESTORE
Back up file
Restore file

BACKUP *source*[drive:][path][filename.ext] *destination*[drive:]

RESTORE *source*[drive:] *destination*[drive:][path][filename.ext]

BACKUP makes backup copies of your files. RESTORE pulls files from the backup and restores them to your main disk. See Chapters 12 and 13 for more details. In DOS 6 and later, the Microsoft Backup (MSBACKUP) utility has replaced these commands.

CD or CHDIR — Change directory

CD [path]

The CD command lets you navigate through the directory tree. Use it to change to a new directory so you can launch programs and work with files in that directory. If your destination directory is a subdirectory of the current directory, you don't have to type its full path; the subdirectory name alone will do. For example, if you're in the \TOP directory and want to change to the \TOP\SUB directory, you can issue the command as **cd sub**. If you issue the command without parameters (just **cd**, nothing else), DOS will display the current directory's path.

COPY — Copy file

COPY *source*[drive:][path][filename.ext]
➥*destination*[drive:][path][filename.ext]

Use this command when you want to copy a file (or a group of files specified by wild cards) from one place (the source) to another (the destination). It leaves the source file intact.

You don't have to type the full drive, path, and file name for both the source and destination. If you don't specify something different, DOS assumes that you mean the current drive and path. If you omit the destination file name, DOS will use the file name from the source file. For example, typing

```
copy myfile.txt b:
```

copies the MYFILE.TXT file from the current drive and directory to the current directory on the B: drive and gives the copy the same name as the original. Similarly, typing

```
copy b:\myfile.txt
```

copies the specified file into the current drive and directory. If you don't supply a source file name, DOS assumes that you mean to copy all the files in the source directory.

DEL or ERASE — Delete file

DEL [drive:][path][filename.ext]

Use this command to remove a file from your disk. It's like taking the file out of the file cabinet and tossing it in the trash. (If you change your mind right away, you can probably fish it out of the trash with UNDEL.)

DELTREE — Delete directory tree

DELTREE [drive:][path]

For serious directory tree pruning! The DELTREE command not only deletes a directory and all the files within that directory, but also all the subdirectories under that directory and all of their files as well. It even deletes hidden files in the directories and subdirectories. In other words, DELTREE will wipe out the entire specified branch of your directory tree.

DELTREE is a very powerful, but potentially dangerous, command. Be sure you use the DIR command first to make sure you know what directories and files you'll erase before you issue the DELTREE command.

DIR — Directory

DIR [drive:][path][filename.ext] /p /w

DIR lists the files (and subdirectories) in a directory. You can specify the drive, path, and files (with wild cards) that you want to see. If you type DIR without any parameters, you get a listing of all the files in the current directory.

Switches

- The *page*, or *pause*, (/p) switch keeps long directory lists from scrolling off the screen before you can read them. DOS displays one screenful of information and then waits for you to press a key before scrolling up the next screen.

- The *wide* switch (/w) displays more file names on-screen. Instead of listing one file on each line with all its information, you get only file names, arranged in several columns across the screen.

MD or MKDIR — Make directory

MD [drive:][path]

If you need to create a new directory or subdirectory, the MD command will do the job for you. You can omit the drive parameter if you want to create the directory on the current drive.

MOVE — Move file

MOVE *source*[drive:][path][filename.ext]
➥*destination*[drive:][path][filename.ext]

The MOVE command lets you move files and also rename directories. When you use it to move files, the effect is the same as copying a file to a new location (destination) and then deleting the original (source) file.

If you don't supply a file name for either the source or destination, DOS won't assume that you want to move all the files in the directory as it would with the COPY command. Instead, DOS will rename the directory. However, the directory must remain in its original location on the directory tree. So, you can rename the C:\TOP\OLD directory C:\TOP\NEW, but you can't rename it C:\BOTTOM\NEW.

RD or RMDIR — Remove directory

RD [drive:][path]

RD removes a new directory or subdirectory. It's the directory equivalent of the DEL command. You can omit the drive parameter if the directory you're deleting is on the current drive. You can't remove the current directory, though.

{Note} The directory must be empty before DOS will let you remove it with this command. To remove a directory containing files, use the DELTREE command.

REN or RENAME — Rename file

REN [drive:][path][oldfilename.ext] [newfilename.ext]

The REN command can rename a file, but the file must remain in its original location. You can't supply a new drive or path for the renamed file. Also, the REN command works only on files, not on directories. To rename a directory, you must use the MOVE command.

UNDELETE — Undelete file

UNDELETE [drive:][path][filename.ext]

UNDELETE lets you retrieve a deleted file. Like plucking a file from a trash can, it works best if used immediately.

UNDELETE works because the DEL command doesn't destroy a file; it just marks the space occupied by that file as being available for recycling. If you act before the disk space gets reused, you may salvage the deleted file.

XCOPY — Extended copy

XCOPY *source*[drive:][path][filename.ext] *destination*[path] /s /e

XCOPY copies an entire directory and its files. The big difference between XCOPY and COPY is that XCOPY recreates directories, not just files. Normally, the command applies to a single directory, but you can extend it to subdirectories as well, effectively cloning entire branches of a directory tree.

You must include a drive or path in the source specification; a file name or wild card isn't sufficient. On the other hand, you can omit the destination if you want to copy to the current drive and directory.

Switches

- The *subdirectory* switch (/s) tells XCOPY to copy subdirectories of the source directory and files in those subdirectories. However, it will ignore empty subdirectories unless you also use the /e switch.

- The *empty* switch (/e) tells XCOPY that you want to copy subdirectories even if they don't contain any files. This lets you duplicate the entire directory structure on the destination drive. You must use this option in combination with the /s switch.

Commands that work with disks

CHKDSK — Check disk

CHKDSK [drive:][path][filename] /f /v

The CHKDSK command checks the status of a disk and reports back. What it's really checking is the index (called the **file allocation table**) that DOS uses to locate files on the disk. CHKDSK can also fix some disk problems.

Switches

- The *fix* switch (/f) tells DOS to go ahead and fix the errors it finds. *Don't* use this option if you're running CHKDSK from Windows or another program.
- The /v switch lists the file name of each file on your disk as it is checked. You probably don't want to use this option when checking your hard drive—the scrolling list of files takes forever.

DEFRAG — Defragment files

DEFRAG [drive:]

DEFRAG is a utility that can reorganize the files on your disk so that DOS can access them faster. DOS sometimes stores parts of a file in locations dispersed around a disk and then reads scattered segments of the file when needed. However, searching all over the disk for fragmented parts of a file can slow things down. DEFRAG will shuffle things around to put files into contiguous blocks, speeding file access.

DISKCOPY (Floppy) Disk copy

DISKCOPY [sourcedrive:][destinationdrive:]

DISKCOPY is your floppy disk duplicator. It lets you copy the entire contents of one floppy disk to another floppy disk. Both disks must be the same size and density.

Interestingly, you can specify the same drive for both the source and destination. DOS will copy from one diskette, store the information in memory or on the hard drive, and prompt you to insert a different diskette so it can record the information.

FORMAT Format disk

FORMAT [drive:] /s /q

The FORMAT command prepares a disk for use with MS-DOS. It creates a new root directory and index (file allocation table), effectively erasing any previous contents of the disk. DOS will prompt you for a volume label for the formatted disk.

Switches

- The *system* (/s) switch copies the hidden DOS system files to the newly formatted disk so you can use it to boot the computer.
- The *quick* (/q) switch tells DOS to skip the normal step of checking the disk for damaged areas and marking those areas as unusable. If you're confident that the disk is in good shape and just want to erase all the files, this switch can save you some time.

LABEL Disk label

LABEL [drive:][label]

The LABEL command lets you change the electronic volume label recorded on a disk. As a result, you're not stuck with the volume label that was assigned to a disk when it was formatted.

SCANDISK — ScanDisk utility

SCANDISK [drive:]

SCANDISK is a disk repair utility included with newer versions of DOS (DOS 6.0 and later). It's intended as a replacement for CHKDSK, although you can use either command. It can diagnose and repair several kinds of damage to the file system on a disk.

UNFORMAT — Unformat disk

UNFORMAT [drive:]

UNFORMAT can save the day if you discover that you've just formatted the wrong disk. It will let you recover a backup copy of the index (file allocation table, or FAT) that DOS uses to track what files are on the disk.

Commands that work with the system

CLS — Clear screen

CLS

Type CLS to clear the screen. It's a good way to clean off the clutter of previous commands and get the DOS prompt back to the top of the screen.

DATE — System date

DATE

DATE lets you adjust the computer's calendar. The command displays the current system date and lets you change it. Just press Enter to accept the current setting.

EXIT — Exit

EXIT

If you switch to the DOS prompt from the DOS Shell or another program, you've actually launched another copy of the DOS command processor. The EXIT command will close that secondary copy of COMMAND.COM and return to the parent program.

HELP and FASTHELP — MS-DOS Help

FASTHELP [command]

or

HELP [command]

or

[command] /?

If you forget a DOS command, you can ask DOS itself for help. In DOS 6, FASTHELP provides brief one-line descriptions of the DOS commands. Just type **fasthelp** at the DOS prompt to get a list of all the DOS commands. DOS versions 4-6 let you get more detailed information, by typing **help** to launch the MS-DOS Help utility. You can also add the /? switch to any DOS command to get a brief summary of the syntax and options available for the command.

MEM — Memory

MEM

Type **mem** to get a report on how much memory is installed in your computer, how much of that memory is being used, and how much is free. You'll know instantly whether you have enough memory available to run that monster program.

PATH — Path

PATH [drive:][path];[drive:][path];...

The PATH command lets you list the directories where DOS will look for executable files if it can't find them in the current directory. Normally, this command is in your AUTOEXEC.BAT file, but you can also use it to change the search path at the DOS prompt.

PROMPT — Prompt

PROMPT newprompt

PROMPT lets you change the appearance of the DOS prompt. This is another command that's usually found in your AUTOEXEC.BAT file; but you can use it on the command line as well.

TIME — System time

TIME

TIME lets you set the computer's clock. The command displays the current time according to the computer's clock and gives you the opportunity to change it. Just press Enter to accept the current setting.

TYPE — Type file

TYPE [drive:][path][filename.ext]

You don't have to start a text editor or word processor just to read a simple text file. The TYPE command will display a text file on-screen. If the file is long and scrolls off the screen, use the ¦MORE option as in the following example to have DOS pause and wait for you to press a key before scrolling to the next screen full of text:

```
type longfile.txt ¦more
```

Accessory programs

In addition to the core DOS commands, current versions of MS-DOS include several utility programs to help you manage your computer system. Here's a brief list of the most significant ones.

DBLSPACE
DRVSPACE

DoubleSpace
DriveSpace

These disk compression utilities let you cram about twice as much information on a disk. See Chapter 24 for more details. Microsoft introduced DoubleSpace in DOS 6 and changed to DriveSpace in DOS 6.22.

DOSSHELL

DOS Shell

The DOS Shell is a graphical environment that lets you manage files by pointing and clicking instead of typing at the command line. See Chapter 25 for more details. DOS Shell is available in DOS 4 through DOS 6.1.

EDIT

MS-DOS Editor

Editor is an easy-to-use text editor that's handy for creating and editing your startup files and batch files. It's included in DOS 5 and later. See Chapter 11 for more details.

MEMMAKER

MemMaker

MemMaker is a DOS 6 utility to configure your computer's memory automatically. It can rearrange device drivers and TSRs in your startup files to optimize their memory usage. If you don't know what that means, see Chapter 23 for more details.

MSAV and VSAFE Microsoft Anti-Virus

Microsoft Anti-Virus searches for computer viruses on your system. Use MSAV for a one-time search, or add VSAFE to your AUTOEXEC.BAT file to continuously monitor your system for viruses. See Chapter 16 for more details about these DOS 6 utilities.

MSBACKUP Microsoft Backup

Microsoft Backup lets you back up your files and restore files from the backup copies. See Chapters 12 and 13 for more details about this DOS 6 utility.

MSD Microsoft diagnostics

This diagnostic utility can help you identify critical hardware and software components of your system and check their status. It's been part of DOS (and Windows) since DOS 5.

SMARTDRV SmartDrive disk cache

SmartDrive can help speed disk access. It's part of DOS versions 5 and above. See Chapter 14 for more details.

28 Oops...What's This Error Message?

If you keep making mistakes, people will eventually try to correct you. DOS doesn't wait that long. One mistake, and you get an error message.

Most of the error messages you will see are simply to bring an incorrect, yet easily rectified situation to your attention. You might mistype a command or leave a disk drive door open. Unfortunately, at some time, you will come across an error message more serious in nature, like when your hard disk dies, or when you accidentally delete an important file from one of your programs.

The rest of this chapter is devoted to explaining some common error messages. The messages are in alphabetical order, to help you find the one currently facing you on the screen (this isn't the sort of chapter you read just for fun).

(Tip)

If you come across a message that isn't included in this chapter, good for you! Check out the manual that came with DOS, read *Using MS-DOS 6.2*, Special Edition, call your local MS-DOS guru; or if you're really stymied, call Microsoft. You'll wait on hold forever, but they'll probably be able to help.

Access denied

You or a program tried to change or erase a file that is marked as read-only or that is in use. If the file is marked as read-only, you can change the read-only attribute with the ATTRIB command. If the file is in use—wait your turn!

Allocation error, size adjusted

The contents of a file have been truncated because the size indicated in the directory isn't large enough for the amount of data in this file. You can try CHKDSK /F or SCANDISK to see if you can fix the problem.

Bad command or file name

This is easily the most common error message. You typed the command wrong at the command line, or you forgot to include the path to the command. Check the command line for spelling errors and for the correct path, then try again.

Bad or missing command interpreter

MS-DOS can't find the command interpreter, COMMAND.COM, so it can't start. Try restarting your computer just to see what happens.

If COMMAND.COM isn't on the boot disk, or a version of COMMAND.COM from a previous version of MS-DOS is on the disk, start DOS using your startup diskette. If it works, reinstall DOS.

Bad or missing file name

MS-DOS couldn't load or locate a device driver during startup. Check your CONFIG.SYS file for the line `DEVICE=`*`file name`*. Make sure that you spell the command correctly and that it directs DOS to the correct device driver. Restart your computer.

If the message appears again, reinstall the device driver. If the error persists, get in touch with whoever sold it to you and make him help you figure it out.

Bad partition table

DOS was unable to find a DOS partition on the hard disk you specified. If you have an emergency disk, use FDISK to create a DOS partition on your hard disk drive. Otherwise, try a third-party disk utility package, like Norton Utilities.

Batch file missing

MS-DOS couldn't find the batch file it was processing, probably because it was renamed or erased.

If the batch file was renamed, rename it back. If the file was erased, restore it from your backups.

Cannot CHDIR to path - tree past this point not processed

CHKDSK was unable to check the specified directory, which means that it couldn't check the entire directory tree. Run CHKDSK /F, or try SCANDISK.

Cannot CHDIR to root

While checking the tree structure of the directory with CHKDSK, DOS was unable to return to the root directory, so it couldn't check the remaining subdirectories. Restart DOS. If the message appears again, your disk is unusable.

Cannot find a hard disk on your computer

Your computer has a hard disk that is incompatible with the Setup program, is supported by a device driver, or isn't working right.

Try starting your computer with the old version of DOS and accessing files on the hard disk. If it works, then you know the hard disk is fine. Contact Microsoft or your computer dealer to find out why your disk isn't compatible.

Cannot find system files

You tried to format a disk with the system files from a drive that doesn't have the system files in its root directory. Change to a drive that does have the system files in the root directory, usually drive C:, and try the FORMAT /S command again.

Cannot load COMMAND.COM, system halted

MS-DOS attempted to load COMMAND.COM, but can't find it. The computer freezes.

This message can indicate that COMMAND.COM has been erased from the disk and directory you used when starting MS-DOS. Restart your computer. If DOS doesn't start, your copy of COMMAND.COM has been erased. Start MS-DOS using your startup diskette and reinstall DOS.

Another possible cause of this message is that a faulty program has corrupted the memory allocation table where MS-DOS tracks available memory. Reboot and then run the same program that was running when the system halted. If the problem occurs again, the program is defective. Get really mad at the dealer or manufacturer who sold you the program.

Cannot perform a cyclic copy

When using XCOPY /S, you tried to specify a target that is a subdirectory of the source. Shame on you. Depending on the directory tree structure, you may be able to use a temporary disk or file to overcome this limitation.

Cannot read file allocation table

The file allocation table (FAT) on your disk is in a bad sector. Your disk is damaged, and recovering data from the bad sectors may be impossible. You can try using UNDELETE to recover each file or your backup disks to restore the data, but neither of those will help you much if the FAT is bad. Better go find your local computer guru for help.

Configuration too large

Your computer couldn't load DOS because you specified too many FILES or BUFFERS in your CONFIG.SYS file, or you specified too large an

environment area (/E switch) to the SHELL command. This problem usually occurs only on systems with less than 256K of memory.

Restart MS-DOS with your system diskette and edit the CONFIG.SYS file on your boot disk. Lower the number of FILES and BUFFERS or the number after the /E switch in the SHELL command. Restart MS-DOS with the edited disk. An alternative is to increase the memory in your system.

Data error reading drive *d:*

DOS couldn't correctly read the data on the specified drive. Usually the disk has developed a defective spot. Try SCANDISK to fix the problem.

Disk boot failure

An error occurred when MS-DOS tried to load into memory. The disk contained IO.SYS and MSDOS.SYS, but DOS couldn't load one of the two files so it couldn't boot.

Start MS-DOS from the disk again. If the error recurs, boot MS-DOS from your startup diskette. If this attempt fails, you have a hardware (disk drive) problem. Contact your dealer.

Disk unsuitable for system disk

You tried to format a floppy disk with bad sectors in the area where DOS normally is stored. You can try reformatting the disk, but you should probably throw the disk away and use another one.

DMA buffer size too small

If you have installed Windows or the EMM386 device driver on your computer, Microsoft Backup for MS-DOS may not have enough room to back up, compare, or restore files.

You must increase the DMA buffer in the Windows SYSTEM.INI file. Use a text editor to open the file (it's in your Windows directory), then add the following line in the [386Enh] section of the file: **DMABUFFERSIZE=32**. Save the file, close the text editor, and restart Windows.

Drive not ready

Something's wrong with the drive you're trying to use. If it's a floppy drive, you probably left the door open or didn't insert the disk correctly. If it's a hard disk drive, the drive may not be properly prepared, or you may have a hardware problem.

Drive or diskette types not compatible

You tried to DISKCOMP or DISKCOPY using different-sized drives. Try again using one drive.

Duplicate file name or file not found

You tried to rename a file using a name that already exists, or the file you attempted to rename doesn't exist. Check your command line, then try again using different names.

EMS page frame not found

You're trying to run a program that needs expanded memory, but you told MemMaker that none of your programs need expanded memory. Just run MemMaker again, and when it asks you the expanded memory question, answer yes.

Error in EXE file

MS-DOS found an error while attempting to load a program stored in an EXE file. Restart MS-DOS and load the program again, this time using a backup copy. If the message reappears, the program is flawed. If you are using a purchased program, contact the dealer or publisher.

Error loading operating system

A disk error occurred while MS-DOS was loading. Restart the computer. If the error occurs again, restart MS-DOS from your startup diskette. If the hard disk doesn't respond (if you can't run DIR or CHKDSK without an error message), your problem is with the hard disk. Contact your dealer. If the hard disk does respond, reinstall DOS.

Error reading directory

MS-DOS encountered a problem while reading the directory during a format procedure, possibly because bad sectors have developed in the file allocation table (FAT) structure.

If the message occurs when DOS reads a floppy disk, the disk is unusable and you should get rid of it. If the message occurs when DOS reads your hard disk, however, the problem is more serious. Call in the guru if you can, or try using ScanDisk to see if it can find (and fix) the problem. Back up your data files on a regular basis to prevent major losses if a problem reading the directory occurs.

Error reading (or writing) partition table

MS-DOS couldn't read from (or write to) the disk's partition table during FORMAT. This error message indicates that the partition table is corrupted. Call in the guru, or try using ScanDisk to see if it can find (and fix) the problem. Run FDISK on the disk and reformat the disk. Then restore the data to your hard disk using your most recent set of full backups.

EXEC failure

MS-DOS encountered an error while reading a command or program from the disk, or the CONFIG.SYS FILES= command has a value that is too low.

Increase the number of FILES in the CONFIG.SYS file by 5, and then restart MS-DOS. If the error recurs, you may have a problem with the disk. Use a backup copy of the program and try again. If the backup copy works, copy it over the problem copy.

If an error occurs in the copying process, you have a flawed disk. If the problem is a floppy disk, copy the files from the flawed disk to another disk and reformat, or toss the original floppy disk. If the problem is the hard disk, immediately back up your files and run SCANDISK. If the problem persists, your hard disk may have a hardware failure.

Expanded memory unavailable

You are trying to run a program that needs expanded memory, but you told MemMaker that none of your programs need expanded memory. Just run MemMaker again, and when it asks you the expanded memory question, answer Yes.

File cannot be copied onto itself

You attempted to COPY a file to the same disk, directory, and file name that it already has. This message usually indicates that you misspelled or omitted parts of the source or destination drive, path, or file name. This error also can occur when you use wild-card characters for file names. Check your spelling and the source and destination names, then try the command again.

File not found

MS-DOS couldn't find the file you specified. The file isn't on the disk or in the directory you specified; or you misspelled the disk drive name, path name, or file name. Check these possibilities and try the command again.

File was destroyed by the virus

Bummer. Microsoft Anti-Virus hit pay dirt during a scan. Choose Delete to delete the infected file and minimize the risk of further damage.

File name device driver cannot be initialized

In CONFIG.SYS, the parameters in the device driver file name are incorrect, or the DEVICE line is in error. Check for incorrect parameters and for

phrasing errors in the DEVICE line. Edit the DEVICE line in the CONFIG.SYS file, save the file, and then restart DOS.

Format not supported on drive *d:*

The FORMAT command can't be used on the drive you selected. DOS displays this message if you entered device driver parameters that your computer can't support. Check CONFIG.SYS for bad DEVICE or DRIVPARM commands.

General failure reading [or writing] drive *d:*

MS-DOS came across an error it doesn't recognize. Chances are you're using an unformatted disk, or the disk drive door is open, or the disk isn't inserted correctly, or you've put a too-low density disk in the drive. If the error occurs on a hard drive, you've got bigger problems. See if you can access the disk at all. If not, you need a new drive.

Incompatible hard disk or device driver

If your computer has a hard disk that's incompatible with DOS, you can usually install DOS anyway. Microsoft provides instructions for setup on most incompatible disks.

Incompatible partition

Your hard disk has a SpeedStore Bootall partition, which is incompatible with Setup. You must install DOS manually.

Incompatible primary DOS partition

You probably have an incompatible partition on your hard disk that must be deleted before you can set up DOS. Use FDISK to delete the partition and create a new one.

Incorrect MS-DOS version

The DOS utility program for the command you just entered is from a different version of MS-DOS.

Find a copy of the program from the correct version of MS-DOS (usually from the MS-DOS master disk) and try the command again. Or, you may be able to use the SETVER command. If you have more than one version of MS-DOS on your hard disk, make sure that your PATH command refers to the directory with the correct DOS files.

Insufficient disk space

The disk doesn't have enough free space to hold the file being written. All MS-DOS programs terminate when this problem occurs, but some non-DOS programs continue.

If you think that the disk has enough room to hold the file, run CHKDSK or SCANDISK to see whether the floppy disk or hard disk has a problem. Sometimes when you terminate programs early by pressing Ctrl-Break, MS-DOS can't do the necessary clean-up work. When this happens, disk space is temporarily trapped.

If you've run out of disk space, delete some unnecessary files. Then try the command again. You can also free disk space by using DEFRAG to defragment the files on the disk or by using a disk compression program like DriveSpace.

Insufficient memory

The computer doesn't have enough free RAM to execute the program or command. Try running MemMaker to make the best use of available memory.

If MemMaker can't free enough RAM, remove device drivers or RAM-disk software from the CONFIG.SYS file and restart MS-DOS. If this fails, your computer doesn't have enough memory for the program or command. You must increase your random-access memory to run the program or command.

Internal stack overflow - System halted

Your programs and DOS have exhausted the stack (the memory space reserved for temporary use). This problem usually is caused by a rapid succession of hardware devices demanding attention. DOS stops, and you must turn the system off and on again to restart DOS.

The problem may not recur, but if it does, you can add a STACKS command statement to your CONFIG.SYS file, like this: **STACKS=9,256**. If you already have a STACKS command statement in your CONFIG.SYS file, increase the number of stacks specified.

Invalid characters in volume label

You tried to enter more than 11 alphanumeric characters, or you entered illegal characters (for example, +, =, /, \ , or ¦) when you typed the disk's volume label. Retype the volume label, following the proper procedure.

Invalid date

You entered an impossible date or used the wrong kind of character to separate the month, day, and year. DOS also displays this message if you enter the date with the keypad when the keypad isn't in numeric mode.

Invalid device parameters from device driver

This is a FORMAT error message that DOS displays when it finds that the disk partition doesn't fall in the right place—technically, on a track boundary. You may have set the DEVICE drivers incorrectly in CONFIG.SYS or attempted to format a hard disk that was formatted with DOS version 2.x (so the total number of hidden sectors isn't evenly divisible by the number of sectors on a track). As a result, the partition doesn't start on a track boundary.

To correct the error, run FDISK before performing a format, or check CONFIG.SYS for a bad DEVICE or DRIVPARM command.

Invalid directory

You made a mistake typing a path on the command line. You specified a directory name that doesn't exist, or you misspelled the directory name, or you forgot to put a backslash between directories, or you typed the wrong path. Check your command line, then try again.

Invalid drive or file name

You entered the name of a nonexistent disk drive; or you mistyped the disk drive, the file name, or both. Check the disk drive name and try the command again.

Invalid drive specification

You made a mistake typing a path on the command line. You specified a drive that doesn't exist, or you specified a drive that for one reason or another cannot be used for the command. Check your command line, then try again.

Invalid media or Track 0 bad - disk unusable

The disk you're trying to format may be damaged, or you may be trying to format a double density disk in a high density drive. Check the density, then try to format the disk again; if the same message appears, the disk is bad and you should throw it away.

Invalid number of parameters

You've entered too few or too many parameters for a command. Check your command line and try again.

Invalid parameter or incorrect parameter

At least one parameter you entered for the command isn't valid. Check your command line and try again.

Consult Chapter 27, "Mini Command Reference," for the correct way to use the command.

Invalid partition table

When you started DOS from the hard disk, DOS detected a problem in the hard disk's partition information.

Restart MS-DOS from a floppy disk. Back up all files from the hard disk (if possible) and run FDISK to correct the problem. If you change the partition information, reformat the hard disk and restore all its files.

Invalid path

You made a mistake typing a path on the command line. The path contains illegal characters, or it has more than 63 characters, or you misspelled a file or directory name. Check the command line and try again.

Invalid path or file name

You entered a directory name or file name that doesn't exist, used the wrong directory name (a directory not on the path), or mistyped a name. Check the command line to see whether the directory and file names are spelled correctly and whether the path is correct. Then try the command again.

Invalid *signature* - Checksum does not match

Anti-Virus suspects there is a virus on your computer, but it cannot identify it. You can get a list of new viruses from Microsoft.

Invalid time

You entered an impossible time or used the wrong kind of character to separate the hours, minutes, and seconds. DOS also displays this message if you enter the time with the keypad when the keypad isn't in numeric mode.

Lock violation

With the file-sharing program (SHARE.EXE) or network software loaded, one of your programs attempted to access a locked file. First try Retry; if unsuccessful, try Abort or Fail.

Memory allocation error, Cannot load COMMAND, system halted

A program damaged the area where MS-DOS keeps track of available and used memory. You must restart MS-DOS.

If this error occurs again with the same program, use a backup copy of the program. If the problem persists, the program has a flaw. Contact the dealer or program publisher.

MIRROR cannot operate with a network

MIRROR can't save file reconstruction information because you asked MIRROR to look at a network drive.

Missing operating system

The MS-DOS hard disk partition doesn't have a copy of MS-DOS on it. MS-DOS doesn't boot.

Start MS-DOS from a floppy disk, then reinstall DOS.

No paper

The printer is out of paper, off-line, or turned off.

No room for system on destination disk

The floppy disk or hard disk wasn't formatted with the necessary reserved space for MS-DOS. You can't put the system on this floppy disk without first copying all the disk's data to another disk and then reformatting the disk.

No target drive specified

You didn't specify a target drive for a command that needs one, such as DISKCOPY. Retype the command, using first a source and then a target disk drive.

Non-DOS disk

MS-DOS doesn't recognize the disk format as a DOS disk. This disk is unusable.

If you have disks from another operating system, like Macintosh System 7, OS/2, or UNIX, this disk was probably formatted under the other operating system.

Non-system disk or disk error - Replace and strike any key when ready

Your floppy disk or hard disk doesn't contain MS-DOS, or a read error occurred when you started the system. MS-DOS doesn't boot. If you're using a floppy disk system, put your startup disk in drive A: and press any key.

The most frequent cause of this message on hard disk systems is that you left a nonbootable floppy disk in drive A: with the drive door closed. Open the door to disk drive A: and press any key. MS-DOS boots from the hard disk.

Not enough memory

The computer doesn't have enough free memory to execute the program or command. Use MemMaker to make more memory available.

If MemMaker can't free enough memory, restart MS-DOS and try the program or command again before loading any resident program. If this method fails, remove any unneeded device driver or RAM-disk software from the CONFIG.SYS file and restart MS-DOS.

If this procedure fails, your computer doesn't have enough memory for this operation. You must increase your RAM to run the program or command.

Not enough space to install selected programs

You need to free up disk space. The easiest way to do this is to delete unnecessary files. You can also run DEFRAG to defragment files, or use DriveSpace to compress your drive.

Not ready

A device isn't ready and can't receive or transmit data. Check the connections, check that the power is on, and check whether the device is ready. For floppy disk drives, check that the disk is formatted and properly seated in the disk drive.

Packed file corrupt

A program file didn't successfully load into the first 64K of memory. This error can occur when a packed executable file is loaded into memory. Use the LOADFIX command to load the program above the first 64K.

Parameters not supported [or] Parameters not supported on drive

You entered parameters that don't exist for a command, or the parameters aren't supported by MS-DOS, or are incompatible with the disk drive that you selected.

Path not found

A file or directory path you named doesn't exist. You misspelled the file name or directory name, or you omitted a path character (\) between directory names or between the final directory name and file name. Another possibility is that the file or directory doesn't exist where you specified. Check these possibilities and try again.

Path too long

You entered a path name that exceeds the 63 character limit of MS-DOS. The name is too long, or you omitted a space between file names. Check the command line. If the phrasing is correct, change to a directory that's closer to the file you want and try the command again.

Program is trying to modify memory

Anti-Virus suspects that an unauthorized program is trying to modify your computer's memory. This can be caused by a network driver loading after VSAFE loads, or by a virus. You should choose Stop, then run Anti-Virus to see if it detects a virus.

Program is trying to stay resident in memory

You selected the Resident option in VSAFE, but VSAFE suspects that another program is trying to load into memory at the same time. This can be caused

by your memory-resident programs loading into memory after VSAFE loads, or by a virus. You should choose Stop, then run Anti-Virus to see if it detects a virus.

Program is trying to write to disk

You selected the General Write Protect option in VSAFE, and VSAFE suspects a program is trying to write to disk. If you know about the program writing to disk, choose Continue. If not, choose Stop, then run Anti-Virus to see if it detects a virus.

Program too big to fit in memory

The computer doesn't have enough memory to load the program or command you invoked. Use MemMaker to free additional memory.

If you have any resident programs loaded (such as DOSKEY), restart MS-DOS and try the command again without loading the resident programs. If this message appears again, reduce the number of buffers (`BUFFERS=`) in the CONFIG.SYS file and eliminate unneeded device drivers or RAM-disk software. Restart MS-DOS. If these actions don't solve the problem, your computer lacks the memory needed to run the program or command. You must increase the amount of RAM in your computer to run the program or command.

Read fault error reading drive *d:*

MS-DOS was unable to read the data, usually from a hard disk or floppy disk. Check that the disk drive door is closed and that the disk is properly inserted.

Resident programs were loaded after VSAFE

You're trying to remove VSAFE from memory, but at least one memory-resident program was loaded after VSAFE. VSAFE wants you to remove the others from memory first. To remove the other programs from memory,

choose the Stop button, and quit each program in order. If necessary, disable the command in the AUTOEXEC.BAT file that loads the program, and then restart your computer.

Root directory contains DOS files

Setup discovered DOS files already stored in your root directory. You must remove those DOS files from your root directory before setting up the new version of DOS.

Same parameter entered twice

You duplicated a switch when you typed a command. Retype the command, using the parameter only once.

Sector not found error reading drive *d:*

The disk drive was unable to locate the sector on the floppy disk or hard disk. This error is usually the result of a defective spot on the disk or defective drive electronics. Try the command again. If it still doesn't work, you may need to reformat the disk, and then restore the data to the disk using your backups.

Seek error reading [or writing] drive *d:*

The disk drive couldn't locate the proper track on the floppy disk or hard disk. This error is usually the result of a defective spot on the floppy disk or hard disk, an unformatted disk, or drive electronics problems. Try the command again. If it still doesn't work, you may need to reformat the disk, then use Restore to put the data back on to the disk.

Since a virus was detected...

Anti-Virus found a virus on your computer and recommends that you restart your computer to minimize damage. Choose Reboot to restart your computer.

SOURCE diskette bad or incompatible

The disk you are copying is damaged or is the wrong format (for example, a high density 5.25-inch disk in a double density 5.25-inch disk drive). DOS cannot read the disk.

Syntax error

You mistyped a command line. Chances are you omitted something, added extra spaces, hit the Spacebar in the middle of a file name or path, or used an invalid switch. Check the command line and try again.

TARGET diskette bad or incompatible [or] TARGET diskette may be unusable [or] TARGET diskette unusable

This DISKCOPY message indicates that a problem exists with the target disk; MS-DOS doesn't recognize the format of the target disk in the drive, or the disk is bad.

Check that the disk is the same density as the source disk, run CHKDSK on the target disk to determine the problem, or try to reformat the disk before proceeding with the disk copy operation.

TARGET media has lower capacity than SOURCE Continue anyway (Y/N)?

This DISKCOPY warning message informs you that the target disk can hold fewer bytes of data than the source disk. The most likely cause is a target disk with bad sectors. If you type **y** (Yes), some of the data on the source disk may not fit onto the target disk.

To avoid the possibility of an incomplete transfer of data, type **n** and use a disk that has the same capacity as the source disk; or (if you aren't copying hidden files) you can use the COPY *.* command to transfer the files.

The ????? virus is known to infect data files...

Anti-Virus displays this message if it detects a virus and you haven't selected the Check All Files option. It wants you to check every file on your disk for infection, which is a good idea.

There is not enough room to create a restore file. You will not be able to use the unformat utility. Proceed with Format (Y/N)?

FORMAT has determined that the disk lacks sufficient room to create a restore file. Without this file, you can't use the UNFORMAT command to reverse the format that you are attempting.

There is not enough space to install MS-DOS

You need to free up disk space in order to install MS-DOS. The easiest way to do this is to delete unnecessary files.

This is not the correct disk

Setup might display this message if you insert a formatted disk for the Uninstall disk. Try a different disk.

Too many primary partitions

DOS doesn't know what to do with all the partitions on your hard disk. You are only allowed four. You'll have to delete one to continue. You should use FDISK to repartition your disk.

Unable to create directory

You mistyped a command line. Chances are that you tried to create a directory that already exists, or you used invalid characters in the directory name. Check the command line and try again.

Unable to load MS-DOS Shell - Retry (Y/N)?

DOS couldn't load the DOS Shell. You may have another program in memory, and the Shell won't fit into memory. Or, the DOS Shell program itself may be corrupted.

Exit the program and try to load the Shell. If the Shell still doesn't load, it's probably corrupted. Reboot your system and load the Shell. If the same error message appears, copy the Shell from a backup disk to your hard disk; or, if you have a version of DOS prior to 6, you can use DOS Setup to reinstall the Shell.

Unrecognized command in CONFIG.SYS

MS-DOS detected an improperly phrased command statement in CONFIG.SYS. Check your CONFIG.SYS file for errors, then restart DOS.

Unrecoverable read error on drive *d:* side *n*, track *n*

MS-DOS couldn't read the data at the described location on the disk. (MS-DOS makes four attempts before generating this message.) Copy all files on the questionable disk to another disk and try the command again. If the original disk can't be reformatted, throw it away.

Unrecoverable write error on drive *d:* side *n*, track *n*

MS-DOS was unable to write to a disk at the location specified. Try the command again; if the same error occurs, the target disk is damaged at that location.

If the damaged disk contains important data, copy the files to an empty, newly formatted disk and try to reformat the damaged disk. If the disk is bad, throw it away.

Verify error

Anti-Virus found an executable (.EXE) file that has changed. The change may have been caused by a virus, but may have been caused by normal activity. Choose the Update button to avoid this message in the future, or choose the Delete button if you believe the file is infected.

Virus found

Anti-Virus found a virus. Choose Clean to remove the virus, or choose Delete to delete the infected file.

Write fault error writing drive *d:*

MS-DOS couldn't write the data to this device. You may have inserted the floppy disk improperly or left the disk drive door open. Another possibility is an electronics failure in the floppy or hard disk drive. The most frequent cause is a bad spot on the disk.

Write protect error writing drive *d:*

You tried to write data to a disk that's write-protected. Use a different disk or remove the write-protection tab on a 5.25-inch disk or slide the write-protection tab to the write-enable position on a 3.5-inch disk.

Your computer uses a delete protection program

This message appears during Setup. Your computer probably has the DELWATCH delete protection program installed. Quit Setup and remove the command that loads DELWATCH from your AUTOEXEC.BAT file, then restart your computer. Run DELPURGE to purge your hard disk of pending delete files. Then run Setup again.

Your computer uses a disk compression program

If you have a disk compression program on your hard disk, you won't be able to create an Uninstall disk during Setup. You should probably back up your hard disk and make a startup diskette before continuing with Setup.

Your computer uses password protection

Setup can't run on a computer with password protection. Quit Setup and disable the password protection program, restart your computer, and then run Setup again.

Your computer uses SuperStor disk compression

You have to run the ADD2WP program in order to make your computer's uncompressed drive available to Setup. The program may be on your SuperStor installation disks, or else you can get it from the manufacturer.

Glossary

3.5-inch disk A floppy disk enclosed in a hard plastic case. These disks come in two capacities: double density (720K) and high density (1.44 MB or 2.88 MB).

5.25-inch disk A floppy disk enclosed in a flexible plastic case. These disks come in two capacities: double density (360K) and high density (1.2 MB).

Access time The average time it takes for a hard disk drive to find and read information from a disk.

Accessory A utility program you can use in conjunction with other programs, especially with **Windows**.

Acoustic modem A modem that connects to the phone handset instead of to the phone line.

Address Where something is stored in memory. Also, a specific device on a network.

Application A software program designed to help you get actual work done, like a word processor or a spreadsheet.

Archive To make a backup file. The backup file is also called an **archive**.

ASCII An acronym for American Standard Code for Information Interchange. It's a standard text format that you use for text-only files.

AUTOEXEC.BAT A file that DOS reads and processes each time you start a PC. It usually includes commands that control the way the computer runs. For example, it may tell DOS where to find certain files, or what directory to make current.

Background computing A feature which allows the computer to perform a function—such as printing or formatting—while, on-screen, another **application** is being processed.

Back up To copy the files from a hard disk to a removable storage medium, such as a floppy disk. The copied files are called **backups**.

Batch file A file that contains a series of DOS commands. DOS executes the commands when you run the batch file.

Baud rate The speed at which data is transmitted by a **modem**. A baud is one complete cycle. At modem speeds higher than 600 bits per second (bps), more bits are stuffed into one cycle to give the higher bps rate.

BBS See *Bulletin board service.*

BIOS An acronym for Basic Input/Output System. The BIOS is a program that controls communications between the **CPU** and **input/output devices**.

Bit The smallest unit of information. Also, the memory or disk space used to store that information.

BPS An acronym for bits per second (bit/sec), it is used to measure communication speed.

Boot The process of starting a computer and loading the operating system.

Buffer An area of memory that temporarily holds information that is being transferred from one place to another, like from a PC to a printer.

Bulletin board service A computer that is set up to receive and distribute messages over a **modem**.

Bus A set of wires or conductors that carries signals among the different computer components.

Byte A measure of information stored on a disk. One byte is equal to eight bits, and just about equal to one character.

Cache An area of fast memory that the **CPU** can use to store information it uses a lot, so that it can run faster.

Capacity The amount of data that can be stored on a disk or in memory. Capacity is measured in bytes, kilobytes (K), megabytes (MB), and gigabytes (G).

CD-ROM An acronym for Compact Disk-Read-Only Memory. CD-ROMs are storage devices that can contain a large amount of data.

CD-ROM drive A device used by the PC to read data from CD-ROMs.

Cell The area of a spreadsheet or table grid where a row and a column intersect.

Central Processing Unit (CPU) The main microprocessor chip controlling the computer; in other words, the brain of the computer. The CPU is stored inside the system unit.

CGA An acronym for Computer Graphics Array, which is an older, low-quality standard for video adapters.

Chip A tiny integrated circuit that either controls computer functions or stores information. The microprocessor and math coprocessor are chips, and read-only memory storage units are chips.

Click To press and release a mouse button.

Clients Computers on a local area network that receive files from the **LAN** file server.

Clip art Pre-designed graphics files that you can buy for use with word processing, graphics, and desktop publishing applications.

Clone An IBM PC-compatible computer built by another manufacturer.

Cluster A group of disk sectors that can be allocated as one unit.

Cold boot Starting a computer by turning it on with the power switch.

Command An instruction given to the computer by the user, or by a program.

COMMAND.COM An essential DOS file, containing the command processor.

Command line Both the line in DOS where you type a command, and the typed command itself.

Compatible Able to work well with others. Both software and hardware are said to be compatible if they work with other PC components.

Computer A machine that processes information.

Computer-Aided Design (CAD) Application programs that you use to design physical objects.

CONFIG.SYS A special DOS file that DOS reads every time you start your computer so it knows how to set up your system.

Continuous-feed paper Perforated computer paper that runs through the sprockets on impact printers so that paper is always available. Also called **tractor-feed** or **fan-fold**.

Conventional memory All of the random-access memory in a PC up to 640K.

CPU See *Central Processing Unit*.

Current directory The directory DOS is working in. Also called the **active directory**.

Current disk The disk DOS is working from. Also called the **active disk**.

Cursor A marker used to indicate the current position of input or output on a monitor display.

Data Any kind of information processed or stored by a computer.

Data file A computer file that stores information that a software program can use.

Database An application used to store and retrieve related sets of information. For example, a mailing list can be stored in a database.

Defragment To reorganize files on a disk into consecutive blocks.

Density A term used to describe the amount of information you can store on a disk. **Double density** disks store 360K or 720K of data; **high density** disks store 1.2 MB, 1.44 MB, or 2.88 MB of data.

Desktop A type of system unit case, designed to fit conveniently on the top of a desk. Also, in Windows 3.1, the monitor screen where windows are displayed.

Desktop publishing program An application that combines text formatting and graphics manipulation to create professional-looking documents.

Dialog box A window that opens on-screen. A dialog box either provides information about the current action or asks you to enter additional information to complete the action.

Digitizing tablet A hardware device you can use to input artwork into your computer by drawing on it with a stylus.

Directory A grouping of files and other directories on a hard disk. DOS uses directories the way you might use file folders to organize data on a disk.

Directory tree The organizational structure of directories on a disk.

Disk A device a computer uses for storing information.

Disk compression The process of reducing the amount of space that files use on a disk.

Disk drive A hardware device that reads and writes information to and from storage disks. Disk drive types include **hard disks**, **floppy disks**, and **CD-ROMs**.

Docking station A hardware component that allows you to use a portable computer as a desktop system.

DOS An acronym for Disk Operating System. DOS is the most common PC operating system. It manages the PC's resources, including files, disks, and programs.

DOS prompt The user interface that appears on-screen when DOS is waiting for a command. Minimally, the DOS prompt displays the current drive like this: A> or C:\>.

DOS Shell A **graphical user interface** built into DOS to provide an alternative to the DOS prompt.

Dot matrix An impact printer that arranges dots in rows and columns to print text and graphics on a page.

Dot pitch The spacing between the pixels on a color monitor.

Double-click The act of pressing and releasing a mouse button twice in rapid succession.

Double density A measurement of disk capacity.

Double-spin A quality of **CD-ROM drives** that spins a disk twice as quickly as standard CD-ROM drives.

Download To transfer files from one computer to another using a **modem**.

DPI An acronym for Dots Per Inch, which is a measurement of image resolution.

Drag The act of pressing and holding down a mouse button and then sliding the mouse pointer to another location, pulling the selected item along.

Draw An application used to draw computer graphics.

Drop The act of releasing the mouse button after completing a **drag**.

E-mail Electronic mail that you can transmit to other computer users on a network or by way of a **modem** and an information service or a **bulletin board service**.

EGA An acronym for Enhanced Graphics Adapter, which is a medium quality standard for video adapters.

EISA An acronym for Extended Industry Standard Architecture, which is a standard design for system buses.

Electronic mail See *E-mail.*

Escape To get out of a situation fast. Usually this is accomplished by pressing the Esc key.

Expandability The amount of room available in a computer for adding peripherals or memory.

Expanded memory A combination of hardware and software that tricks some computers and programs into accessing more than 1 MB of memory by swapping pages of memory in the lowest 1 MB of RAM.

Expansion card A printed circuit board that fits into an expansion slot in the system unit for controlling peripherals or adding memory. Also called an **expansion board**.

Expansion slot A slot on the **motherboard** where you can attach an expansion card.

Extended memory Memory above 1 MB used by PCs based on x86 microprocessors.

External modem A modem that you attach to a PC using cables, instead of being installed inside the system unit.

FAT An acronym for File Allocation Table. DOS writes a FAT on every disk during formatting and uses it to locate files stored on that disk.

Fax Short for facsimile. A way of transmitting data, most commonly over telephone lines.

File A collection of data stored on a disk for future use. For example, a letter or a worksheet can be stored as a file.

File allocation table See *FAT*.

File extension Three characters following a dot (.) at the end of a file name.

File Manager Part of the Windows **GUI** that you use to control your files.

File name The name you give a file so that you and DOS can find the file on the disk. A file name has two parts: the name can be up to eight characters long; the extension can be three characters long.

File server A computer which controls files, programs, and access on a local area network.

File specification The complete name and path to a file stored on a disk. The file specification tells DOS where to find the file.

File transfer protocol A communications feature that ensures that information is transmitted properly from one computer to another.

Fixed disk See *Hard disk*.

Flatbed scanner An automatic scanning device similar to a copy machine.

Floppy disk A removable magnetic device you use to store computer files. Also called a **disk**, a **floppy**, or a **diskette**. Floppy disks come in two basic sizes: 3.5-inch or 5.25-inch.

Floppy disk drive A device that reads and writes information on a floppy disk.

Font A specific size and style of character that can be printed or displayed by a PC.

Footprint The amount of space a computer uses on the **desktop**.

Format The process that prepares a disk for use. Also, the layout of information on a page, and the particular way a PC stores data. For example, graphics files are stored in a graphics format; text files are stored in a text format.

Function keys The keys on a PC keyboard that are labeled with the letter F and a number from 1 to 12 (some keyboards don't have all 12). Function keys perform tasks or execute commands specific to the application being used.

Gigabyte (G) About one billion **bytes**.

Graphic accelerator A **video adapter** used to increase the processing speed for displaying information on a monitor.

Graphic adapter See *Video adapter*.

Graphical User Interface (GUI) An easy-to-use user interface that combines graphics, menus, and plain English commands so you can communicate with the PC. For example, Microsoft Windows is a GUI. See also *GUI*.

Gray scale The different shades of gray that a scanner can translate into computer data.

Group In Microsoft Windows, a group is a collection of related programs. These programs are stored together in a group window represented by a group **icon**.

GUI An acronym for Graphical User Interface. It is pronounced "gooey."

Hand scanner A hand-held scanning device.

Hard copy Printed information. Hard copy is sometimes called **computer printout**.

Hard disk A data storage device usually fixed inside the system unit. Hard disks usually range in size from 20 MB to over 250 MB.

Hardware The physical parts of the computer that you can see and touch. For example, the keyboard, the monitor, and the case that houses the system unit are all hardware.

High density A measurement of disk capacity.

Hz An abbreviation for hertz, which is a measurement of cycles per second.

I/O An abbreviation for input/output.

I/O controller The device that controls how the computer passes information through the I/O ports.

I/O device A peripheral device that can exchange information with the computer.

I/O ports Sockets on the computer where I/O devices are connected.

Icon A picture used in a **graphical user interface** to represent an element within the program. In Microsoft Windows, some common icons represent files, disks, programs, and groups.

Input Data put into the computer for processing.

Installation Setting up **hardware** or **software** so that you can use it.

Interface A point of communication between parts of the PC, or between the PC and you.

Internal modem A modem that connects to the computer in an expansion slot inside the system unit.

ISA An acronym for Industry Standard Architecture, which is a standard design for a system bus.

Joystick A pointing or input device you use mostly for playing computer games.

Keyboard An input device you use to enter data or commands by typing.

Kilobyte (K) Used to measure disk capacity and memory. One kilobyte is equal to 1,024 bytes, but is usually rounded to equal one thousand **bytes**.

LAN See *Local area network.*

Laptop A computer that you can carry around easily.

Laser printer A nonimpact printer that uses a laser beam and toner to create an image on paper similar to a copy machine.

Local area network (LAN) A group of computers linked by cables in a small area, such as one office building.

Local bus A direct connection between the **CPU** and the computer's **RAM** and other devices.

Math coprocessor A computer chip designed to perform complex calculations. A math coprocessor usually is built into the **microprocessor** or is added to the **motherboard**.

Megabyte (MB) A unit of measure equal to about one million **bytes**.

Memory The electronic circuitry where a PC stores information that it is not currently using.

Memory resident software A software program that remains in memory for use, even while other programs are loaded.

Microprocessor The main chip that contains all the elements of the PC's **central processing unit**.

Microsoft Windows An operating environment developed by Microsoft Corporation for use with DOS. Windows uses a **graphical user interface** to make it easier for you to use your PC.

Modem A device you use for transmitting data over telephone lines. Short for *mo*dulator/*dem*odulator.

Monitor The hardware that displays the information you type on the keyboard and the PC's response to commands. The monitor also is called a **display** or **screen**.

Motherboard The main circuit board in the system unit. It usually holds the CPU and the RAM and has slots for attaching expansion boards.

Mouse A pointing device you use with some programs to input data.

Mouse pad A rubber pad that provides a uniform surface for a mouse to slide on.

Mouse pointer The symbol that shows you the location of the mouse on-screen.

MS-DOS A version of DOS developed by Microsoft Corporation.

Multimedia Applications that use a combination of graphics, text, sound, and video.

Multitasking The capability of running more than one application at the same time.

Nanosecond About one billionth of a second.

Network A group of computers linked together to share data and resources.

Network interface card (NIC) An expansion card that lets you attach your PC to a network.

Notebook A portable PC small enough to fit in a briefcase.

Operating system A group of software programs that provides the instructions you need to control a PC.

OS/2 A PC operating system.

Output Data after it is processed by the computer and returned to a format that you can understand.

Parallel port A type of port on the system unit, to which you usually attach printers.

Path The route the operating system must follow to find a file stored on a disk. Usually, a path includes the disk drive, all directories between the root directory and the file, and the complete file name.

PC An acronym for Personal Computer. Usually, PC refers to an IBM-compatible personal computer.

Peripherals Hardware devices attached to the main system unit. A printer, modem, and mouse are all peripherals.

Pixel A unit of measurement. Each pixel is one of many dots on the screen that forms information to be displayed. Short for **picture element**.

Point Moving the mouse pointer so that it is touching the desired element on-screen. Also a measure of type size.

Port An electrical socket on the outside of the system unit where you connect external **peripherals**. Most PCs come with at least one parallel port, one serial port, one game port, and one video adapter port.

Portable A small PC that you can carry easily. Often, a portable runs on batteries. Different types of portables include **notebooks** and **laptops**.

POST An acronym for Power On Self-Test, which is a series of checks that the computer runs during start up to make sure everything is working right.

PostScript The name of a printer control language that has become a standard for graphics printing.

Power supply The battery or other device that supplies the electricity a computer needs to run.

Program A set of instructions that tells the computer what to do. Also called **application** or **software**.

Program Manager Part of the Windows **GUI** that you use to start other programs.

Protocol The language that sets the rules for communication between hardware devices.

RAM An acronym for Random-Access Memory. RAM is the electronic memory where the computer can store information until it is needed or stored on a disk.

RAM disk An area of RAM that emulates a disk drive.

Resolution A measurement of the quality or the sharpness of a monitor, the image on a monitor, or a printed image. Resolution usually is measured by the number of dots used to make the image.

ROM An acronym for Read-Only Memory. ROM is memory that cannot be erased or added to. ROM provides the instructions the computer needs to get started each time you turn it on.

Root directory The main directory on a disk. All other directories grow out of the root.

Scanner A device you use to input printed information into the PC.

SCSI An acronym for Small Computer Systems Interface. SCSI is a standard used for connecting some devices to a PC. It is pronounced "skuzzy."

Serial port A type of port on the system unit, usually used for attaching communications devices.

Shell An interface between the operating system and the user.

SIMM An acronym for Single In-line Memory Module, which is a standardized circuit board that contains one or more RAM chips.

Software Programs made up of coded instructions that you run on the computer to tell the hardware how to process information. There are two basic types of software—**system software** and **application software**.

Sound board An **expansion board** you add to your PC if you want to be able to produce music and other sounds. Sound boards are usually used with **multimedia** applications.

Spreadsheet An application used to manipulate numbers and perform calculations.

Startup disk See *System disk*.

Storage device A hardware device used by the PC to store data. For example, hard disks, floppy disks, and tapes are storage devices.

Subdirectory A directory that is created in another directory. Technically speaking, all directories on a disk are subdirectories of the root.

Super VGA (SVGA) A high quality video adapter standard.

Surge suppressor A power protection device that filters the voltage between an outlet and a hardware component to prevent damage from sudden voltage changes.

Syntax The format and rules you must follow when you type a DOS command.

System bus The electronic wiring and adapter slots that let the CPU communicate with RAM and peripheral devices.

System disk A disk that has the operating system files on it so it can be used to load **DOS**.

System software Software that instructs the different pieces of **hardware** how to operate and how to respond to your commands. For example, an operating system is a system software program.

Telecommunications Using **modems** to exchange data between computers over telephone lines.

Uninterruptible Power Supply (UPS) A power protection device that has a built-in battery to protect the computer components from a power outage.

User interface A point of communication between the user and the PC. The **DOS prompt**, the **DOS Shell**, and **Microsoft Windows** are examples of user interfaces.

Video adapter The circuit that controls the monitor. The video adapter is built into the **motherboard** or installed as an **expansion card**. The monitor connects to the video adapter via the video adapter port on the system unit. Common types include **CGA**, **EGA**, **VGA**, and **SVGA**.

Video Graphics Array (VGA) A common video graphics adapter standard that provides high resolution.

Virus A software program, maliciously designed to damage existing files, programs, and disks, and surreptitiously transferred to the PCs of unsuspecting owners.

Warm boot Restarting a computer without turning it off first.

What you see is what you get (WYSIWYG) A term that describes software programs that display information on the monitor exactly as it prints on the page. Pronounced "wizzywig." See also *WYSIWYG*.

Wild card A character used by **DOS** to represent other characters. For example, a question mark (?) represents any single character. An asterisk (*) represents any group of characters.

Window An area on-screen used by some programs, like Microsoft Windows, to display information. Some windows contain applications, some contain icons that represent the applications, and some contain documents created with the applications.

Windows An operating environment developed by Microsoft Corporation for use with DOS. Windows uses a **graphical user interface** to make it easier for you to use your PC.

Word processor An application used for entering and manipulating text.

Write-protection The way you protect the files stored on a disk from being overwritten with new data.

WYSIWYG An acronym for What You See Is What You Get, pronounced "wizzywig."

Index

Symbols

*** (asterisk) wild-card character, 56, 58-59, 101-102, 404**
? (question mark) wild-card character, 56-57, 102-103, 404
3 1/2-inch floppy disks, 71, 389
5 1/4-inch floppy disks, 71, 389
80286 microprocessor, 17
8088 microprocessor, 17

A

access time (hard disks), 389
accounting applications, 226
acoustic modems, 389
addresses (memory), 389
Alt key, 21
American Standard Code for Information Interchange (ASCII), 334-335, 389
Anti-stealth viruses (Microsoft Anti-Virus), 220
anti-virus utilities, 212-222
APPEND command, 291
applications, *see* programs 223-224, 389
archives, 389
see also backups
arranging windows, 279
arrow keys, 254-255
ASCII (American Standard Code for Information Interchange), 334-335, 389
asterisk (*) wild-card character, 56, 58-59, 101-102, 404
AUTOEXEC.BAT file, 130, 333, 389
application installation, 246-247
backups, 142
commands, 130-132
editing, 141
MS-DOS Editor, 143-145
text editors, 148-149
skipping, 134
troubleshooting, 132-135
viewing, 131
automatic backups (Microsoft Backup), 169

B

background computing, *see* multitasking
BACKUP command, 351-352
Backup dialog box, 165, 167
Backup Fixed Disk dialog box, 160
backups, 151-154, 390
automatic (Microsoft Backup), 169
directories, 162-163
DOS versions, 159-166
files (Microsoft Backup), 167
hard disks, 160, 162
DOS prompt, 161-162
DOS Shell, 160-163
Microsoft Backup, 165-166
on another hard disk, 169
installation disks, 241-242
restoring, 154, 171-172, 174-176, 346
determining when to restore, 172-174
MS Backup, 179-182
RESTORE command, 176-178
scheduling, 153-154
startup files, 142, 299-300
storing, 158-159
tape drives, 169
testing, 158-159, 168
viruses, 214
BASIC files, 67, 140
Basic Input/Output System (BIOS), 390
BAT files, 67
batch files, 67, 390
AUTOEXEC.BAT file, 333
calling, 334
commands, 333-334
directory locations, 335
hiding text, 334
naming, 332-333

pausing, 334
running, 332
text editors, 334-335
typing remarks, 334
writing, 330-336
baud rate (modems), 390
BBSes, *see* bulletin board services
BIOS (Basic Input/Output System), 390
bits, 390
blank screens (monitors), 347
boards, *see* expansion cards
boot disks, *see* emergency boot disks
boot sector viruses, 203-205
booting, 24, 124-125, 390
cold boot, 391
emergency boot disks, 213
POST (power on self-test), 124-125
warm boot, 404
troubleshooting, 26-28
bps (bits per second), 390
Brain virus, 206
BREAK command, 129
buffers (memory), 390
BUFFERS command, 129
bulletin board services, 211, 390
bus, 390, 403
EISA (extended industry standard architecture), 395
ISA (industry standard architecture), 398
local buses, 399
bytes, 73, 294, 390

C

C:\>, 25-26, 394
backups, restoring, 177
directory locations, 47
editing, 335-336
hard disk backups, 161-162
Windows, 284-287
caches (memory), 194-197, 391
CAD (computer-aided design) applications, 228, 392
calendar, setting, 15, 62
CALL command, 334
capacities (floppy disks), 70, 73, 391
cards, *see* expansion cards
Cascade virus, 201, 206
case-sensitivity (commands), 31
CD command, 45, 55, 132, 351, 353
CD-ROM drives, 391, 394
CD-ROMs, 391
cells (spreadsheets), 391
Central Point Anti-Virus, 216
central processing units, *see* CPUs
CGA (Computer Graphics Array), 391
character interfaces, 218
CHDIR command, 353
chips, 16, 391
math coprocessors, 399
SIMMs (single in-line memory modules), 402
CHKDSK command, 155, 185-188, 291, 351, 357
Clean (Viruscan), 217
Clear command (Edit menu) (MS-DOS Editor), 147
clearing screen, 34-35
clicking mouse, 266, 325, 391
clients, 391
clip art, 391 *see also* graphics
Clipboard (MS-DOS Editor), 147
clock, setting, 15, 62
clones, 391
closing
applications, 271, 343-344
menus, 325
CLS command, 34-35, 132, 351, 359
clusters (disk sectors), 391
cold boot, 24, 391
COM files, 67
command lines, 392
COMMAND.COM file, 392
commands, 14, 29-30, 392
APPEND, 291
AUTOEXEC.BAT files, 130-132
BACKUP, 351-352
batch file commands, 333-334
BREAK, 129
BUFFERS, 129
CALL, 334
case-sensitivity, 31
CD, 45, 55, 132, 351, 353
CHDIR, 353
CHKDSK, 155, 291, 351, 357
CLS, 34-35, 132, 351, 359
command line, 392

COPY, 14, 84-85, 351, 353
COPY CON, 62-63
CPAV, 216
DATE, 15, 351, 359
DBLSPACE, 352, 362
DEFRAG, 108, 155, 291, 351, 357
DEL, 14, 98, 351, 354
DELTREE, 120-121, 351, 354
DEVICE, 129
DEVICEHIGH, 129
DIR, 14, 49-52, 345-346, 351, 354-355
DISKCOPY, 79, 351, 358
DOS prompt, 25-26
DOSSHELL, 132, 322, 352, 362
DRVSPACE, 316, 352, 362
ECHO, 334
EDIT, 143, 352, 362
EMM386, 291
ERASE, 98, 354
EXIT, 352, 360
FASTHELP, 330, 352, 360
FASTOPEN, 291
FILES, 129
FORMAT, 15, 74-76, 351, 358
HELP, 14, 328-330, 352, 360
HIMEM, 137
LABEL, 76, 351, 358
LASTDRIVE, 129
LH, 132
LOADHIGH, 132
MD, 45, 113, 351, 355
MEM, 295, 352, 360
MEMMAKER, 291, 300-302, 352, 362
MIRROR, 78
MOUNT, 319
MOVE, 14, 93-94, 351, 355
MSAV, 155, 215, 218, 353, 363
MSBACKUP, 163, 179, 352, 363
MSCDEX, 291
MSD, 73, 352, 363
NLSFUNC, 291
parameters, 14, 30, 32
PATH, 132, 351, 361
paths, 342
PAUSE, 334
PROMPT, 47, 132, 351, 361
RD, 118, 351, 355
REM, 334
REN, 92-93, 351, 356
RENAME, 356
RESTORE, 171-172, 176-178, 351-352
RMDIR, 355
SCANDISK, 155, 291, 351, 359
SET TEMP, 132
SMARTDRV, 291, 352, 363
spaces, 31-32
SUBST, 291
switches, 14, 32
syntax, 15, 30-31, 341, 403
TIME, 15, 352, 361
TREE, 46, 111
TYPE, 63, 352, 361
UNDELETE, 14, 104-108, 346, 351, 356
UNFORMAT, 15, 77, 346, 351, 359
VER, 33-34
viewing last executed command, 103-104
VOL, 76
VSAFE, 215, 291, 363
WIN, 132
XCOPY, 94-95, 351, 356-357
comments (batch files), 334
communications programs, 228
compatibility, 392
DoubleSpace and SmartDrive, 312-313
Microsoft Backup, 166
compression, 310, 393
floppy disks, 318-319
hard disks, 185, 194, 310-317
computer-aided design (CAD), 228, 392
Computer Graphics Array (CGA), 391
computers, *see* PCs
CONFIG.SYS file, 126-127, 392
application installation, 246-247
backups, 142
command lines, 128-129
editing, 127, 140-141
MS-DOS Editor, 143-145
text editors, 148-149
skipping, 134
troubleshooting, 132-135
viewing, 128
context-sensitive help, 258
continuous-feed paper, 392
Control-menu box (Windows), 271
controllers (I/O controllers), 398
conventional memory, 294, 392
COPY command, 14, 84-85, 351, 353
Copy command
Edit menu, 147
File menu, 280, 327
COPY CON command, 62-63

copying
directories, 94-95
files, 84-87, 89-92, 279-280
multiple files, 88-89
with the DOS Shell, 327-328
floppy disks, 79-81
CPAV command, 216
CPUs (central processing units), 16-17, 391
Ctrl key, 21
cursor-movement keys, 21
cursors, 20, 266, 392
Custom Setup (MemMaker), 302-304
customizing
Microsoft Anti-Virus, 220-221
prompts, 141

D

data files, 392
see also **files**
databases, 225-226, 393
dates (file creation), 51, 62
DATE command, 15, 351, 359
DBLSPACE command, 352, 362
defaults
directories, 53-55
drives, 52-53
Defrag utility, 192-193
DEFRAG command, 108, 155, 291, 351, 357
defragmenting disks, 108, 192-194, 393
DEL command, 14, 98, 351, 354
Delete Sentry, 107
Delete Tracker, 107-108
deleting
directories, 118-122, 282
files, 98-100
from directories, 281-282
with wild-card characters, 100-103
DELTREE command, 120-121, 351, 354
density, 393-394, 397
hard disks, 70-73
floppy disks, 70-73, 76
desktop (Windows), 393
desktop publishing, 228, 393
DEVICE command, 129
device command statements (CONFIG.SYS file), 128
device drivers, 128, 136
DEVICEHIGH command, 129
dialog boxes, 254-256, 393
differential backups (Microsoft Backup), 168
digitizing tablets, 393
dimmed commands (menus), 325
DIR command, 14, 49-52, 345-346, 351, 354-355
directories, 42, 51, 393
backups, 162-163
batch files, 335
copying, 94-95
creating, 45-46, 112-115
current directory, 392
defaults, 53-55
deleting, 118-122, 282
designing, 112
DOS prompt, 47
File Manager (Windows), 277
files
copying, 89-92, 279-280
finding, 345-346
listing, 49-52, 64-67
moving, 93-94, 279-280
printing list, 67-68
renaming, 282
selecting, 281
listing, 110-111
naming, 109-110
navigating, 115-118
paths, 43-44, 89-92
commands, 342
creating, 141
printing list, 111
programs, finding, 242, 250-251
renaming, 121-122, 282
root directory, 42-44, 402
subdirectories, 42, 403
switching, 45, 55
temporary directories, creating, 141
trees, viewing, 42, 46, 393
disk caches (memory), 194-197
disk drives, 393
see also **CD-ROM drives; floppy disk drives; hard disks**
disk space, viewing available, 51, 239-240
disk-doubling programs, 310-320
DISKCOPY command, 79, 351, 358
diskettes, *see* floppy disks
disks, *see* floppy disks; hard disks
DLL files, 67
docking stations, 393
DOS commands, *see* commands
DOS prompt, 25-26, 394
editing, 335-336

DOS Shell, 321-322, 394
copying files, 327-328
listing files, 326
menus, 325-326
monitors (video mode settings), 324
mouse operations, 325
selecting files, 326-327
starting, 322
DOSSHELL command, 132, 322, 352, 362
dot matrix printers, 394
dot pitch (monitors), 394
double-density disks, 70-73, 394
double-clicking, 267, 325, 394
double-spin CD-ROM drives, 394
DoubleSpace, 194, 310-320
downloading files, 202, 394
dpi (dots per inch), 394
drag-and-drop, 279-280
dragging, 267, 394
drawing programs, 394
drivers (device drivers), 128, 136
drives, 19
defaults, 52-53
density, 70-73
drive letters, 39-41
switching, 53
tape drives, 169
see also CD-ROM drives; floppy disk drives; hard disks
DriveSpace, 311-320
drop-down menus, 252
DRVSPACE command, 316, 352, 362

E

e-mail, 394
ECHO command, 334
EDIT command, 143, 352, 362
editing
AUTOEXEC.BAT files, 141, 143-145, 148-149
CONFIG.SYS files, 127, 140-141, 143-145, 148-149
DOS prompt, 335-336
editors
MS-DOS Editor, 143-145
text editors, 148-149
writing batch files with ASCII text editors, 334-335
EDLIN line editor, 334
EGA (enhanced graphics array), 395
EISA (extended industry standard architecture), 395
ejecting floppy disks from drives, 27
electronic mail, *see* e-mail
emergency boot disks, 78-79, 213, 403
EMM386 command, 291
emulation (printers), 245
enhanced graphics array, *see* EGA
Enter key, 20
ERASE command, 98, 354
error messages, 32-33, 365-388
Access denied, 365
Allocation error, size adjusted, 366
Bad command or file name, 35, 86, 161, 163, 295, 366
Bad or missing command interpreter, 366
Bad partition table, 366
Batch file missing, 367
Cannot CHDIR to path – tree past this point not processed, 367
Cannot CHDIR to root, 367
Cannot find a hard disk on your computer, 367
Cannot find system files, 367
Cannot load COMMAND.COM, system halted, 368
Cannot perform a cyclic copy, 368
Cannot read file allocation table, 368
Configuration too large, 368-369
Data error reading drive d:, 369
Disk boot failure, 369
Disk unsuitable for system disk, 369
DMA buffer size too small, 369-370
Drive not ready, 370
Drive or diskette types not compatible, 370
Duplicate filename or file not found, 370
EMS page frame not found, 370
Error in EXE file, 370
Error loading operating system, 371
Error reading (or writing) partition table, 371
Error reading directory, 371
EXEC failure, 371-372

Expanded memory unavailable, 372
File cannot be copied onto itself, 372
File name device driver cannot be initialized, 372-388
File not found, 86, 173, 372
File was destroyed by the virus, 372
Format not supported on drive d:, 373
General failure reading [or writing] drive d:, 373
General failure reading drive C. Abort, retry, fail?, 153
Incompatible hard disk or device driver, 373
Incompatible partition, 373
Incompatible primary DOS partition, 373
Incorrect MS-DOS version, 374
Insufficient disk space, 244, 374
Insufficient memory, 374
Internal stack overflow – System halted, 375
Invalid characters in volume label, 375
Invalid date, 375
Invalid device parameters from device driver, 375
Invalid directory, 116, 376
Invalid drive or file-name, 376
Invalid drive specification, 376
Invalid media or Track 0 bad – disk unusable, 376
Invalid number of parameters, 376
Invalid parameter or incorrect parameter, 377
Invalid partition table, 377
Invalid path, 377
Invalid path, not directory, or directory not empty, 119
Invalid path or file name, 377
Invalid signature – Checksum does not match, 377
Invalid time, 378
Lock violation, 378
Memory allocation error, Cannot load COMMAND, system halted, 378
MIRROR cannot operate with a network, 378
Missing operating system, 378
No paper, 379
No target drive specified, 379
Non-system disk or disk error, 124, 174, 379
Not enough memory, 380
Not enough space to install selected programs, 380
Not ready, 380-388
Packed file corrupt, 380
Parameters not supported, 381
Path not found, 381
Path too long, 381
Program is trying to modify memory, 381
Program is trying to stay resident in memory, 381-382
Program is trying to write to disk, 382
Program too big to fit in memory, 382
Read fault error reading drive d:, 382
Resident programs were loaded after Vsafe, 382-383
Root directory contains DOS files, 383
Same parameter entered twice, 383
Sector not found error reading drive d:, 383
Seek error reading [or writing] drive d:, 383
Since a virus was detected..., 383
SOURCE diskette bad or incompatible, 384
Syntax error, 384
TARGET diskette bad or incompatible, 384
Target diskette unusable, 384
TARGET media has lower capacity than SOURCE Continue anyway (Y/N)?, 384
The ????? virus is known to infect data files..., 385
There is not enough room to create a restore file. You will not be able to use the unformat utility, 385
There is not enough space to install MS-DOS, 385
This is not the correct disk, 385
Too many primary partitions, 385

Unable to create directory, 386
Unable to load MS-DOS Shell - Retry (Y/N)?, 386
Unrecognized command in CONFIG.SYS, 386
Unrecoverable read error on drive d: side n, track n, 386
Unrecoverable write error on drive d: side n, track n , 386-387
Verify error, 387
Virus found, 387
Write fault error writing drive d:, 387
Write protect error writing drive d:, 387
Your computer uses a delete-protection program, 387
Your computer uses a disk compression program, 388
Your computer uses password protection, 388
Your computer uses SuperStor disk compression, 388

Esc key, 21, 395
executable files, 66-67, 251
EXIT command, 352, 360
Exit command (File menu), 148, 271, 328
exiting
applications, 259-260, 344
MS-DOS Editor, 148
startup menus to DOS, 28-29
Windows, 28-29, 271
expandability (PCs), 395
expanded memory, 294, 303-304, 395
expansion cards, 395
NICs (network interface cards), 400
sound boards, 402
expansion slots, 395
Express Setup (MemMaker), 302-304
extended industry standard architecture, *see* EISA
extended memory, *see* high memory
extensions (file names), 38-40, 51, 396
external modems, 395

F

F-Prot Professional, 217-218
F3 key, 103-104
false alarms (viruses), 219, 222
fan-fold paper, 392
FASTHELP command, 330, 352, 360
FASTOPEN command, 291
FATs (file allocation tables), 184, 395
faxes, 395
File Manager (Windows), 273-274, 396
confirmations, 282
directory tree, 277
disk drive icons, 276
DOS programs, starting, 286-287
menus, 274-276
file servers, 396
file specifications, 396
file transfer protocol, *see* ftp
files, 38, 51, 395
backups, 152
DOS versions, 159-166
Microsoft Backup, 167
restoring, 154, 176-182
scheduling, 153-154
storing, 158-159
testing, 158-159
BASIC files, 67
batch files, 67, 330-336, 390
COMMAND.COM file, 392
compression, 310-313
copying, 84-87
DOS Shell, 327-328
in directories, 279-280
multiple files, 88-89
to directories, 89-92
data files, 392
dates (file creation), 51, 62
deleting, 98-100
from directories, 281-282
with wild-card characters, 100-103
downloading, 202, 394
executable files, 66-67, 251
extensions, 38-40, 51, 396
file specifications, 396
finding, 344-345
wild-card characters, 55-59
Help files, 67
hidden files, 125
initialization files, 67
listing, 64-65
directories, 49-52
DOS Shell, 326
printing lists, 67-68
wide format, 65-66
moving, 93-94, 279-280

naming, 38-39, 45, 396
printing, 257-258
QBASIC files, 67, 140
renaming, 87-89, 92-93, 282
saving, 256-257
selecting, 326-327, 280
sizes (bytes), 51
startup files
AUTOEXEC.BAT file, 130-135, 141, 246-247, 333, 389
backups, 142, 299-300
CONFIG.SYS file, 126-129, 132-135, 140-141, 246-247, 392
Microsoft Backup, 169
skipping, 134
system files, 67
text files
creating, 61-65
opening, 63-64
time (file creation), 51, 62
undeleting, 78, 104-108, 346
virus infection, 202-203
write-protection, 404
FILES command, 129
financial applications, 226
finding
files, 344-345
wild-card characters, 55-59
programs, 250-251
fixed disks, *see* hard disks
flatbed scanners, 396
floppy disk drives, 27, 396
floppy disks, 19, 396
3 1/2-inch disks, 71, 389
5 1/4-inch disks, 71, 389
backups, 152
DOS versions, 159-166
restoring, 154
scheduling, 153-154
storing, 158-159
testing, 158-159
capacity, 70, 73, 391
compression, 318-319
copying, 79-81
density, 70-73
ejecting from drives, 27
emergency boot disks, 78-79, 213
FATs (file allocation tables), 184
files
bad sectors, 185
cross-linked files, 184
fragmentation, 184
lost clusters, 184
formatting, 74-77, 396
handling, 82
labels, 81
storage, 82
system disks, 403
troubleshooting, 348-349
uncompressing, 319-320
unformatting, 77, 346
virus infection, 201-202
volume labels, 76
write-protecting, 81-82, 213, 404
fonts, 396
footprint, 396
FORMAT command, 15, 74-76, 351, 358
formatting disks, 74-77, 396
fragmentation (disks), 191-192
ftp (file transfer protocol), 396
full backups (Microsoft Backup), 168
function keys, 21, 103-104, 397

G

games, 230
gigabytes, 397
graphical user interface, *see* GUI
graphics
applications, 227
clip art, 391
digitizing tablets, 393
graphics accelerators, 397
graphics mode (monitors), 324
grayscales, 397
GUI (graphical user interface), 218, 262, 397

H

hand scanners, 397
hard copy (printouts), 397
hard disks, 19, 397
access time, 389
backups, 151-154, 159-166
Microsoft Backup, 165-166
restoring, 154
scheduling, 153-154
storing, 158-159
testing, 158-159
boot sector viruses, 203-205
compression, 310-311, 313-315
adjusting size of compressed area, 317
DoubleSpace, 313
DriveSpace, 316

defragmenting, 108
FATs (file allocation tables), 184
problems
bad sectors, 185
cross-linked files, 184
fragmentation, 184
lost clusters, 184
testing, 154-155
CHKDSK, 185-188
ScanDisk, 185-186, 188-191
troubleshooting, 348
uncompressing, 319-320
viewing available disk space, 51, 239-240
hardware, 10, 397
addresses, 389
device drivers, 128
RAM (random-access memory), 18
troubleshooting, 339-340
viewing hardware information, 240
Help, 258-259
Help files, 67
MS-DOS Editor, 143
on-line help, 328-330
technical support, 350
HELP command, 14, 328, 352, 360
hertz (Hz), 398
hidden files, 125
hiding batch file text, 334
high-density disks/drives, 70-73, 397
high memory, 135-136, 294
device drivers, loading, 136
TSRs, loading, 137
HIMEM command, 137
Hz (hertz), 398

I

I/O (input/output), 398
IBM OS/2 operating system, 11, 400
icons, 262, 398
incremental backups (Microsoft Backup), 168
industry standard architecture, *see* ISA
INI files, 67
initialization files, 67
input, 398
input/output, *see* I/O
insertion point, 20
installation (programs), 241, 398
backup installation disks, 241-242
directory locations, 242
DOS programs, 243-247
installation utilities, 243
printer configurations, 245
Windows applications, 247-248
integrated programs, 233
Intel Pentium chip, 17
interface, 13, 398
character interface, 218
GUI (graphical user interface), 218, 397
menu interface, 218
user interface, 403
internal modems, 398
ISA (industry standard architecture), 398

J-K

Jerusalem virus, 206
Joshi virus, 200
joysticks, 398

keyboards, 20-21, 398
keys
Alt key, 21
arrow keys, 254-255
Ctrl key, 21
cursor-movement keys, 21
Enter key, 20
Esc key, 21, 395
function keys, 21, 103-104, 397
kilobytes (K), 73, 294, 398

L

LABEL command, 76, 351, 358
labels (floppy disks), 76, 81
language (PostScript printer control language), 401
LAN (local area network), 399
laptop, 399
laser printer, 399
LASTDRIVE command, 129
launching, *see* starting
LH (LOADHIGH) command, 132
line editors, 334
listing
directories, 110-111
files, 49-52, 64-65
DOS Shell, 326
printing lists, 67-68
wide format, 65-66
LOADHIGH command, 132
loading
device drivers into high memory, 136
TSRs into high memory, 137
local area network (LAN), 399
local bus, 399
logic bomb viruses, 205

M

Macintosh System 7 operating system, 11
maintenance upgrades (programs), 234
math coprocessor, 399
MD command, 45, 113, 351, 355
megabytes (M), 73, 294, 399
MEM command, 295, 352, 360
MemMaker, 127, 138, 296-308
  navigating, 301-302
  reports, 306-307
  setup, 302-304
  starting, 300-302
  troubleshooting, 307-308
MEMMAKER command, 291, 300-302, 352, 362
memory, 293-294, 399
  addresses, 389
  buffers, 390
  conventional memory, 294, 392
  disk caches, 194-197, 391
  expanded memory, 294, 303-304, 395
  high memory, 135-136, 294, 395
  NOEMS, 297
  optimizing, 138
  RAM (random-access memory), 18, 401
  ROM (read-only memory), 18, 402
  software requirements, 296
  UMBs (upper memory blocks), 297
  upper memory, 294
  viewing available memory, 239, 295
  viruses, 200
memory optimization programs, 297
memory resident programs, 399
memory-resident anti-virus utilities, 212
menu interfaces, 218
menus, 252-253
  closing, 325
  dimmed commands, 325
  DOS Shell, 325-326
  drop-down menus, 252
  File Manager (Windows), 274-276
  keyboard-support, 254
  mouse-support, 253-254
  opening, 325
  startup menus, exiting to DOS, 28-29
  submenus, 253
  Windows, 264-266
messages, *see* error messages
microchips, *see* chips
microprocessors, 16, 399
  80286, 17
  8088, 17
  math coprocessors, 399
  Pentium, 17
Microsoft Anti-Virus, 215-216, 218-221
  Anti-Stealth, 220
  customizing, 220-221
  starting, 218, 221
Microsoft Backup, 163-168, 179-182
Microsoft Windows, *see* Windows
minimizing windows, 267-268
MIRROR command, 78
MKDIR command, 355
modems, 399
  acoustic modems, 389
  baud rate, 390
  external modems, 395
  internal modems, 398
  virus infection, 202
monitors, 399
  blank screens, 347
  clearing screen, 34-35
  dot pitch, 394
  resolution, 402
  turning on/off, 24-25
  video adapters, 403
  video mode settings, 324
motherboards, 16, 395, 399
MOUNT command, 319
mouse, 400
  clicking, 266, 325, 391
  double-clicking, 267, 325, 394
  dragging, 267, 394
  dropping, 394
  mouse pads, 400
  navigating
    dialog boxes, 255-256
    menus, 253-254
  pointing, 266, 325, 400-401
  troubleshooting, 347
MOVE command, 14, 93-94, 351, 355
moving
  files, 93-94, 279-280
  windows, 267
MS Diagnostics, 240
MS-DOS, 400
MS-DOS Editor
  Clipboard, 147
  exiting, 148
  Help, 143
  navigating, 145-148
  startup files, editing, 143-145
MSAV command, 155, 215, 218, 363
MSAVE command, 352
MSBACKUP command, 163, 179, 352, 363

MSCDEX command, 291
MSD command, 73, 352, 363
multimedia, 400
multitasking, 263, 400

N

nagware (shareware), 235
naming
batch files, 332-333
directories, 109-110
files, 38-39, 45, 396
nanoseconds, 400
National Computer Security Association (NCSA), 207
navigating
directories, 115-118
MemMaker, 301-302
Microsoft Backup, 164
MS-DOS Editor, 145-148
NCSA (National Computer Security Association), 207
network interface card (NIC), 400
networks, 399-400
NIC (network interface card), 400
NLSFUNC command, 291
NOEMS, 297
Norton Anti-Virus, 216
notebook computers, 400

O

on-line help, 328-330
opening
files, 63-64
menus, 325
operating systems, 11, 400
organizers, 228-229
OS/2 operating system, 11, 400
output, 400
OVL files, 67

P

paper (continuous-feed paper), 392
parallel ports, 400
parameters (commands), 14, 30, 32
PATH command, 132, 351, 361
paths (directories), 43-44, 89-92, 400
commands, 342
creating, 141
PAUSE command, 334
pausing batch files, 334
PC (personal computer), 392, 401
clones, 391
expandability, 395
laptops, 399
notebooks, 400
OS/2 operating system, 11, 400
portables, 401
troubleshooting
blank screen, 347
dead PC, 307-308
floppy disks, 348-349
hard disks, 348
hardware, 339-340
human error, 338
mouse, 347
software, 338-339, 342-344
technical support, 350
turning on/off, 348
viruses, 339
turning on/off, 24-25
Pentium chip, 17
peripherals, 401
personal computer, *see* PC
PIM (personal information manager), 228-229
Ping-Pong virus, 206
piracy (software), 202, 211
pixels, 401
pointing, 266, 325, 347, 400-401
portables, 401
ports, 401
I/O ports, 398
parallel ports, 400
serial ports, 402
POST (power on self-test), 124-125, 401
PostScript printer control language, 401
power supply, 401
surge suppressors, 403
troubleshooting, 348
UPS (uninterruptible power supply), 403
power switch (computers), 24-25
presentation programs, 227
preventing viruses, 206-207
printers
configuring for applications, 245
dot matrix printers, 394
emulation, 245
laser printers, 399
PostScript printer control language, 401
resolution, 402
troubleshooting, 349
printing
directory lists, 67-68, 111
files, 257-258
reports (MemMaker), 306-307

program groups, 397
Program Manager (Windows), 269-271, 401
programs, *see also* utilities
CAD (computer-aided design), 228, 392
closing, 271, 343-344
communications, 228
databases, 225-226, 393
desktop publishing, 228, 393
dialog boxes, using, 254-256
directory locations, finding, 250-251
disk caches, 194-197
disk-doubling, 310-320
drawing, 394
exiting, 259-260, 344
financial, 226
games, 230
graphics, 227
installation, 241
backup installation disks, 241-242
directory locations, 242
DOS programs, 243-247
installation utilities, 243
printer configurations, 245
Windows applications, 247-248
integrated packages, 233
memory optimization, 297
memory requirements, 296
memory-resident, 399
menus, 252-254
multimedia, 400
multitasking, 263, 390, 400
PIMs (personal information managers), 228-229
presentations, 227
shareware, 234-235
spreadsheets, 225, 402
starting, 250-252, 342-343
suites, 233
system requirements, 231, 237-240
testing, 232
upgrades, 233-234
using Help, 258-259
Windows, 232-233, 247-248
word processing, 224, 404
see also software; utilities
PROMPT command, 47, 132, 351, 361
prompts
DOS prompt, 25-16, 394
backups, creating/restoring, 161-162, 177
customizing, 141, 335-336
directory location, 47
Windows, 284-287
protocols (communications), 401

Q

QBASIC files, 67, 140
QBASIC.EXE file, 140
question mark (?) wild-card character, 56-57, 102-103, 404

R

RAM (random-access memory), 18, 401
RAM disks, 402
RD command, 118, 351, 355
read-caching mode (SmartDrive), 197
read-only memory, *see* ROM
rebooting computers, 24, 35-36
REM command, 334
remarks, typing (batch files), 334
REN command, 92-93, 351, 356
RENAME command, 356
renaming
directories, 121-122, 282
files, 87-89, 92-93, 282
reports (MemMaker), 306-307
resizing, *see* sizing
resolution, 394, 402
RESTORE command, 171-172, 176-178, 351-352
restoring
backups, 154, 171-176, 346
determining when to restore, 172-174
MS Backup, 179-182
RESTORE command, 176-178
Windows, 269
RMDIR command, 355
ROM (read-only memory), 18, 402
root directories, 42-44, 402

running
batch files, 332
Microsoft Anti-Virus, 221
see also **starting**

S

saving files, 256-257
SCANDISK command, 155, 291, 351, 359
ScanDisk utility, 185-191
scanners, 402
flatbed scanners, 396
hand scanners, 397
scanning for viruses, 212
anti-virus utilities, 215-218
false alarms, 219, 222
Microsoft Anti-Virus, 218-220
VSAFE, 222
screens
clearing, 34-35
blank screens, 347
SCSI (small computer system interface), 402
sectors (disks), 391
selecting files
DOS Shell, 326-327
multiple files, 280
self-replicating viruses, 204-205
serial ports, 402
servers (file servers), 396
SET TEMP command, 132
shareware, 234-235
shells, *see* DOS shell; interfaces
signatures (viruses), 212
SIMM (single in-line memory module), 402
single in-line memory modules (SIMMs), 402
sizing
compressed area (hard disks), 317
windows, 267-270
skipping startup files, 134
small computer system interface (SCSI), 402
SmartDrive, 195-197, 312-313
SMARTDRV command, 291, 352, 363
sockets, *see* ports
software, 12
piracy, 202, 211
system software, 403
troubleshooting, 338-339, 342-344
viruses, 339
see also programs; utilities
sound cards, 402
spaces (commands), 31-32
speeding computers with disk caches (memory), 194-195
spreadsheets, 225, 381, 402
standards (Windows programs), 264-266
starting
DOS programs from File Manager, 286-287
DOS Shell, 322
MemMaker, 300-302
Microsoft Anti-Virus, 218
programs, 250-252, 342-343
VSAFE, 222
Windows, 264
startup disks, *see* emergency boot disks
startup files
AUTOEXEC.BAT file, 130, 333, 389
commands, 130-132
editing, 141
installation, 246-247
troubleshooting, 132-135
viewing, 131
backups, 142, 299-300
CONFIG.SYS file, 126-127, 392
command lines, 128-129
device command statements, 128
editing, 127, 140-141
installation, 246-247
troubleshooting, 132-135
viewing, 128
skipping, 134
startup menus, exiting to DOS, 28-29
stealth viruses, 203
Stoned virus, 206
storage devices, 403
storing
backups, 158-159
floppy disks, 82
subdirectories, 42, 403
submenus, 253
SUBST command, 291
suites (programs), 233
surge suppressors, 403
SVGA (SuperVGA), 403
switches (commands), 14, 32
switching
between DOS and Windows, 287-288
directories, 45, 55
drives, 53
syntax (commands), 15, 30-31, 341, 403
SYS files, 67
System 7 operating system, 11

system bus, *see* bus
system disks, *see* emergency boot disks
system files, 67
system requirements (programs), 231, 237-240

T

tape drives, 169
tapes, 18
technical support, 350
telecommunications, 403
temporary directories, creating, 141
terminate-and-stay resident programs, *see* TSRs
testing
  applications, 232
  backups, 158-159, 168
  disks, 154-155
    CHKDSK utility, 185-188
    ScanDisk utility, 185-186, 188-191
  POST (power on self-test), 401
text editors, 148-149, 334-335
text files
  creating, 61-65
  opening, 63-64
text mode (monitors), switching to graphics mode, 324
TIME command, 15, 352, 361
tractor-feed paper, 392
tree (directory tree), 42, 393
  copying, 95
  viewing, 46, 110-111
TREE command, 46, 111
Trojan horse viruses, 205
troubleshooting
  AUTOEXEC.BAT file, 132-135
  blank screens, 347
  booting, 26-28
  commands, 341-342
  CONFIG.SYS file, 132-135
  dead PC, 307-308
  floppy disks, 348-349
  frozen computer, 35-36
  hard disks, 348
  hardware, 339-340
  human errors, 338
  mouse, 347
  printers, 349
  software, 338-339, 342-344
  technical support, 350
  turning on/off computers, 348
  viruses, 339
TSRs (terminate-and-stay resident programs)
  loading into high memory, 137
  Windows, 286
turning on/off
  computers, 24-28, 348
  monitors, 24-25
TXT files, 66
TYPE command, 63, 352, 361

U

UMBs (upper memory blocks), 297
uncompressing disks, 319-320
UNDELETE command, 14, 104-108, 346, 351, 356
undeleting files, 78, 104-107, 346
  Delete Sentry, 107
  Delete Tracker, 107-108
Undo disks (ScanDisk utility), 191
UNFORMAT command, 15, 77, 346, 351, 359
unformatting disks, 77, 346
uninterruptible power supply, *see* UPS
upgrades (applications), 233-234
upper memory, 294, 297
UPS (uninterruptible power supply), 403
user interface, 403
utilities, 230
  anti-virus utilities, 212-222
  CHKDSK, 185-188
  Defrag, 192-193
  ScanDisk, 185-186, 188-191
  Windows, 286

V

V Shield (Viruscan), 217
variant strains (viruses), 204
VER command, 33-34
versions
  DOS
    history, 34
    viewing, 33-34
  upgrades (applications), 234
VGA (video graphics array), 404
video adapters, 403
  CGA (Computer Graphics Array), 391
  EGA (enhanced graphics array), 395
  graphics accelerators, 397
  SVGA (super VGA), 403
  VGA (video graphics array), 404

video modes (monitors), 324
Viruscan, 216-217
viruses, 199-206, 339, 404
backups, 214
benign, 203
eradicating, 214
infection methods
boot sector viruses, 203-205
files, 203
floppy disks, 201-203
modems, 202
memory, 200
prevention methods, 206-207, 210-212
scanning, 212
anti-virus utilities, 215-218
false alarms, 219, 222
Microsoft Anti-Virus, 218-220
VSAFE, 222
signatures, 212
VOL command, 76
volume labels (floppy disks), 76
VSAFE, 222
VSAFE command, 215, 291, 363

W

warm boot, 24, 404
wild-card characters, 55-59, 100-103, 404
WIN command, 132
Windows, 11, 261-262, 399, 404
desktop, 393
DOS, switching between DOS and Windows, 287-288
DOS commands, incompatibilities, 288-291
DOS prompt, 284-287
DOS Shell, 287
exiting, 28-29, 271
File Manager, 273-274, 396
customizing
confirmations, 282
directory tree, 277
disk drive icons, 276
DOS, starting, 286-287
menus, 274-276
MemMaker, 304
menus, 264-266
multitasking, 263
Program Manager, 269-271, 401
programs, 232-233, 247-248
prompt, editing, 335-336
SmartDrive, 197
standards, 264-266
starting, 264
TSRs, 286
windows, 262, 404
Control-menu box, 271
directories, arranging, 279
DOS windows, 284-287
moving, 267
sizing, 267-270
word processing programs, 224, 404
write-caching mode (SmartDrive), 197
write-protecting floppy disks, 81-82, 213, 404
writing batch files, 330-336
WYSIWYG (what you see is what you get), 404

X-Y-Z

XCOPY command, 94-95, 351, 356-357

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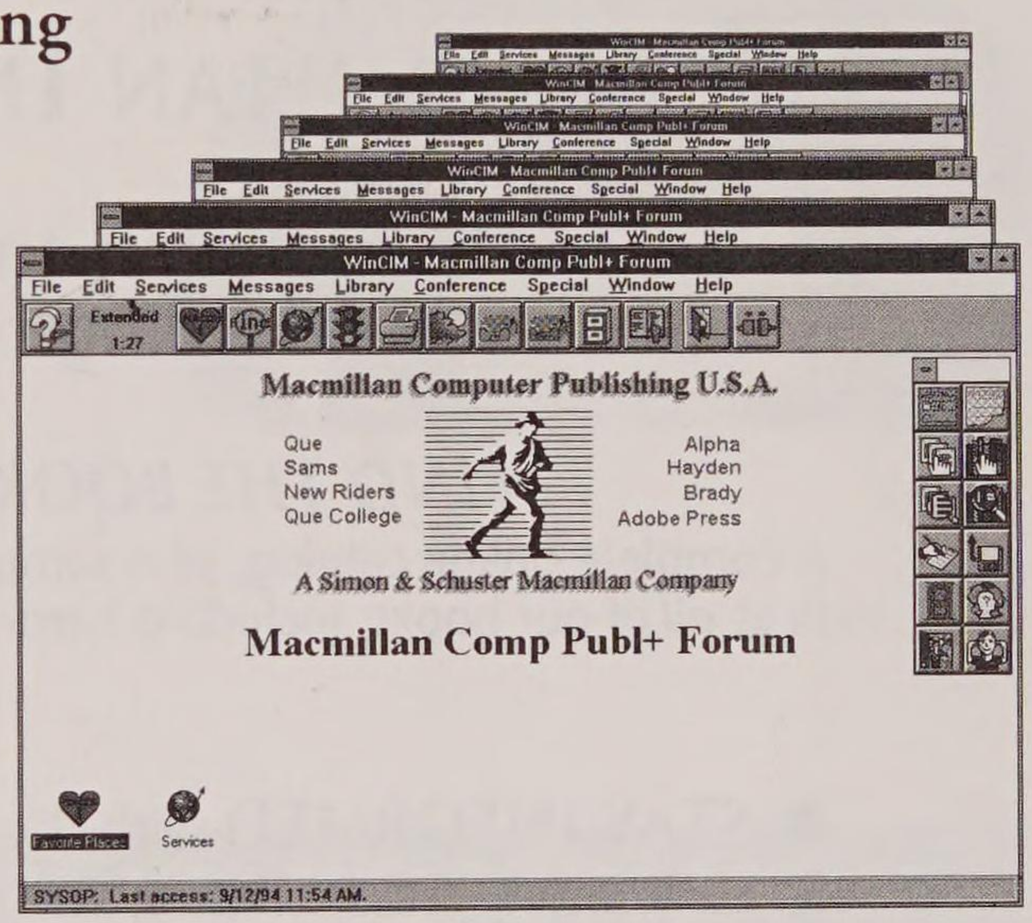

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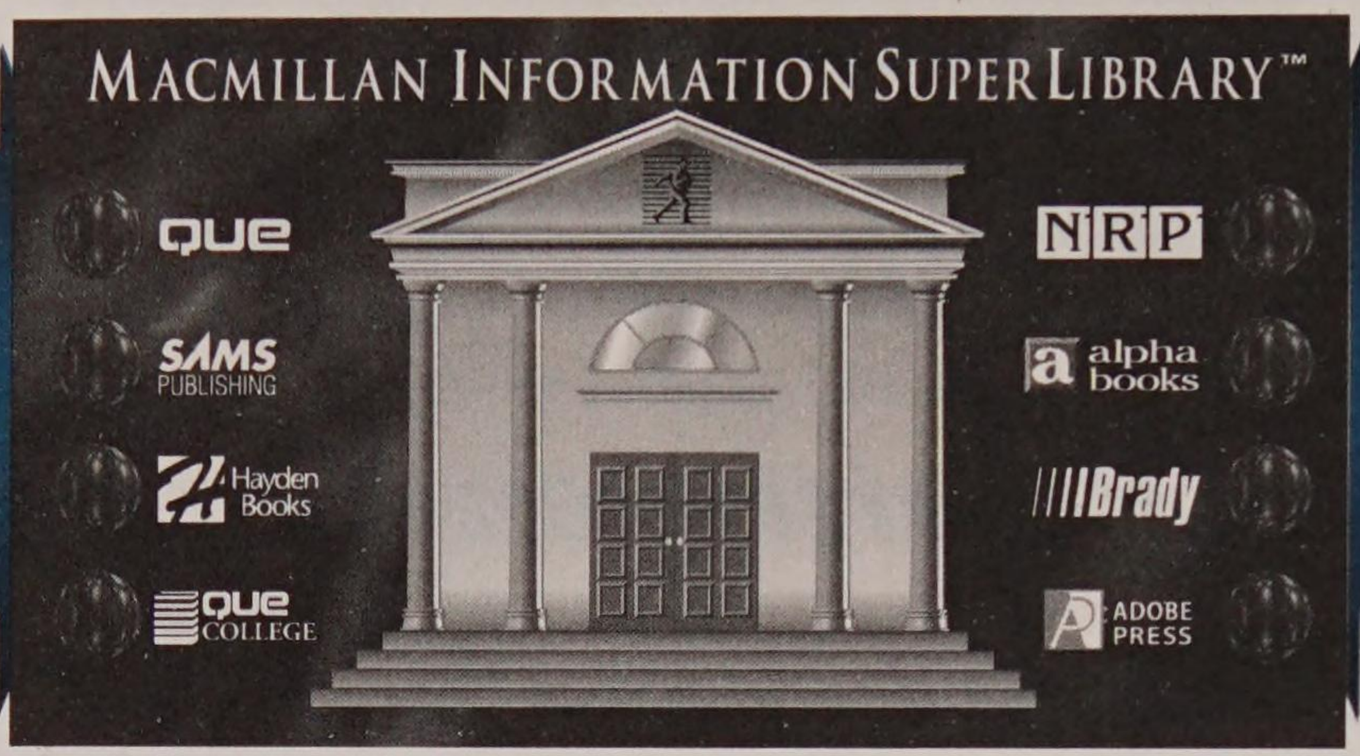

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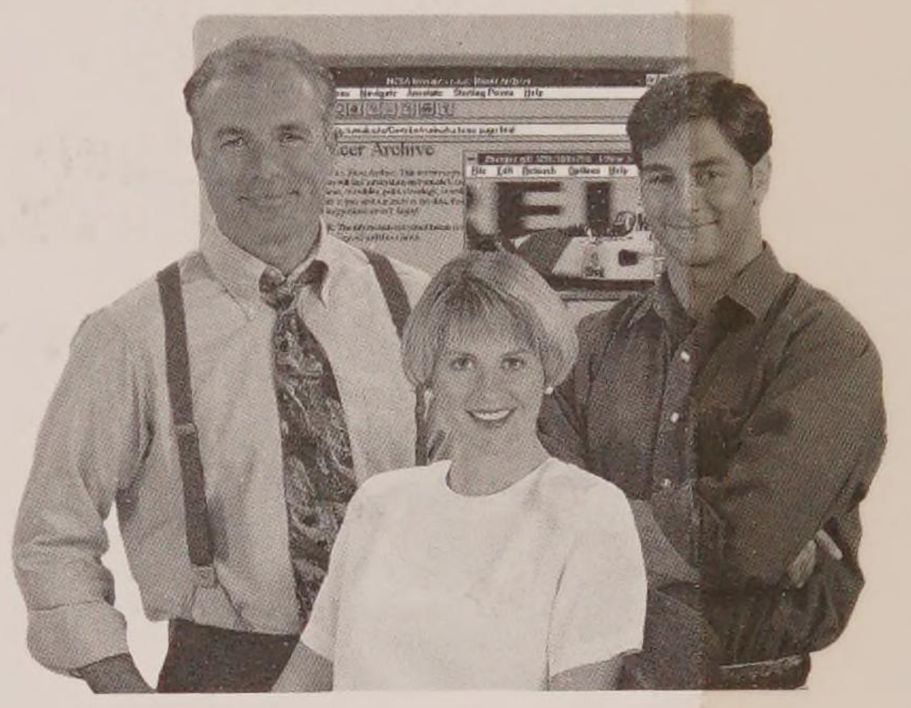

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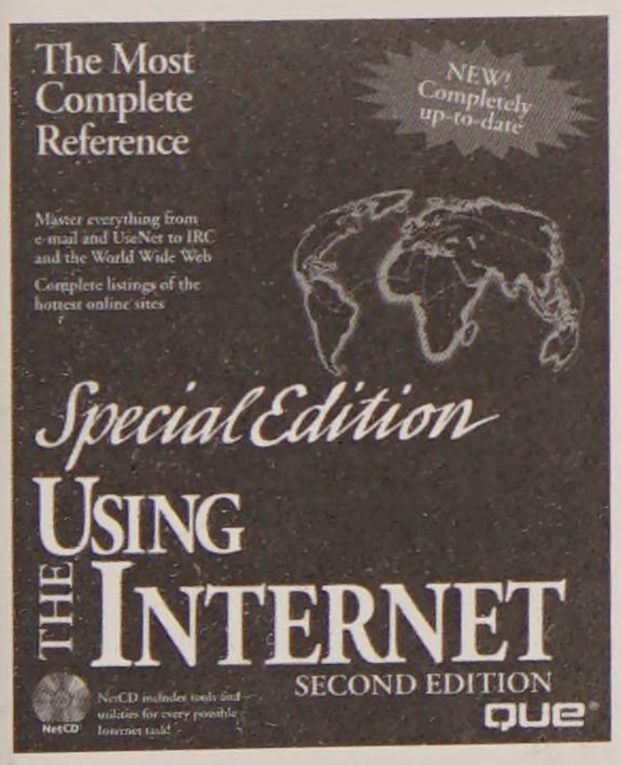

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Gerry Routledge understands exactly what you need to know to make DOS work for you. He is a computer consultant and has 20 years of experience teaching courses on all major software applications for DOS and Windows.™

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